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# ***JPRS Report***

## **Soviet Union**

### ***EKO: ECONOMICS & ORGANIZATION OF INDUSTRIAL PRODUCTION***

No 6, June 1987

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# Soviet Union

## EKO: Economic & Organization of Industrial Production

### No 6, June 1987

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## Renewal of Credit, Finance System Discussed

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[Discussion by V. Ye. Manevich, doctor of economic sciences, Institute of Economics of the USSR Academy of Sciences (Moscow): "Updating the Credit-Finance System"]

[Text] It is impossible to expand the rights and responsibility of enterprises without restructuring the sales sphere. The current organization of this sphere (funding, preliminary orders, assigning suppliers to consumers, agreements following passively after the plan, which can be revised) makes it superfluous to have economic competition among enterprises for the best satisfaction of the demands of the consumer and, conversely, gives rise to a struggle on the part of consumers for commodity supplies. For efficient socialist management one must have competition not among consumers, but among suppliers. It is precisely this competition that can serve as a mechanism for economic stimulation that provides for constant improvement of quality and updating of products, technical progress, a tendency toward a reduction of prices and production outlays, and precise satisfaction of the demands of the consumer.

Necessary conditions for the appearance in economic life of elements of economic competition among suppliers are, first, the opportunity for the consumer to select the supplier, the rejection of funding and the assignment of suppliers to consumers, and the development of wholesale trade in means of production; second, the possibility for the supplier to offer the consumer better conditions for delivery, particularly through reducing prices.

These questions have been raised and discussed in economic literature, especially during a period when preparing for and conducting the reform in the middle of the 1960's, but they have never been resolved in practice. In literature they raise the question of an immediate (and not gradual) rejection of funding, the need for flexible prices, the stronger role of agreements, the reinforcement of their legal basis, and the material responsibility of departments and ministries for harm caused to the enterprises as a result of unsubstantiated changes in plans.

Resolute steps were taken on the path to restructuring the sales sphere. The decree of the CPSU Central Committee and the USSR Council of Ministers, "On Improving Planning and Economic Incentives and Perfecting the Management of the Production of Consumer Goods in Light Industry," envisions developing at trade fairs free wholesale trade in consumer goods by production associations (enterprises) of the system of the Ministry of

Light Industry. The enterprises and associations in conjunction with the trade organizations were permitted to establish contract prices for especially fashionable goods and reduce these prices as the demand was satisfied.

The main tendency in price dynamics should be their reduction. But a reduction in prices for outdated or aging commodities should serve as the main mechanism for forcing an updating of products. Granting sellers and buyers the right to coordinate prices and reduce them requires a restructuring of the financial system which in its current form impedes price reduction and renewal of products since the reduction of prices means a reduction of budget income.

Putting part of the net income into the budget is theoretically possible in various financial forms:

in the form of a certain proportion of the price of the commodity ("commodity tax," in financial practice—turnover tax);

in the form of payments that are proportional to the fixed capital and circulating capital assigned to the enterprise ("tax on capital," in financial practice—payment for funds);

in the form of a certain fixed proportion of the income (income tax); an approximation of the income tax is the shared distribution of profit which is practiced during the course of a number of experiments, in particular, at the Sumy Scientific Production Association imeni M. V. Frunze and at AvtoVAZ. Since the beginning of 1987 the shared distribution of profit and self-financing has been extended to enterprises and associations of the Ministry of Chemical and Petroleum Machine Building, and also several other industrial ministries. Shared distribution of profit differs from income tax because of the individualization of the normatives of distribution of profit, the possibility of revising them, and the limitedness of the sphere of application.

The previously planned "free residual profit" which is now one of the most important sources of budget income is a fixed amount contained in the price of the commodity and therefore by its very nature this financial form can be included more with the "commodity tax" (similar to the turnover tax) than the "income tax." An analogous transformation can take place with any form of deductions from profit. Thus if when determining the amounts of income tax one is not limited to establishing it with an overall norm but plans directly beforehand the absolute amount of it for each enterprise and association, this qualitatively changes the financial nature of this form, transforming it from a particular proportion of the income into a previously fixed part of the commodity price.

And so net income can be redistributed and deposited into the budget on the basis of three different principles, each of which corresponds to a particular form of withholding: depending on the price of the commodity—turnover tax, free residual profit; depending on the capital that is used—payment for capital; depending on the income—income tax.

Now let us see how these different financial forms of deductions into the budget correspond to price dynamics. "Turnover tax" depends directly on the price of the commodity and any reduction of prices means a reduction of deposits into the budget; therefore any price reduction should be accompanied by a compensation for losses in income to the budget. As a result it becomes difficult to reduce prices for outdated products and, consequently, outdated products turn out to be more profitable than new ones. Increased profitability of outdated products retards their removal from production.

Management practice is trying by various methods to overcome the negative consequences of the functioning of the "commodity tax." Each year funds are allotted for marking down unmarketable commodities and they are also intended for reimbursement for budget losses. They try to compensate for the negative consequences of the high profitability of outdated products by using price increments for new products. But all of these measures inevitably turn out to be ineffective because they are intended to rectify the consequences of the "commodity tax" which ensue from the very nature of this financial form. Extensive utilization of increments to the prices for new technical equipment does not achieve its goal: these increments cannot compensate for the high profitability of older products that have long been assimilated, since their price is not reduced; finally, these increments create incentive not only for real, but also false updating of products, and then they simply generate price increases.

Equally ineffective are funds intended for reimbursement for losses from price reductions. The modern rates of technical progress and the updating of products are so high that reimbursement for losses in income from the "commodity tax" resulting from updating products and reducing prices requires immense amounts of money that have not been established beforehand. On the whole one can state that the very financial form of "commodity tax" inevitably impedes price reduction and updating of products and, consequently, makes technical progress and accounting for supply and demand more difficult, and leads to losses in the sphere of sales. The fact that sellers and buyers cannot react flexibly to the condition of supply and demand ends up in immense losses for the national economy and the budget, overstocking in individual sections of the economy, a loss of the "commercial appearance," spoilage of products, and so forth.

Now let us consider the influence on price setting of the second form of deducting accumulations into the budget—"tax on capital" (payment for capital). The amount

of payment for capital depends directly on the amounts of fixed capital and circulating capital used by the enterprise and not on the amounts of their income. Consequently, this financial form can withdraw far from equal parts of the incomes of various enterprises.

In principle one cannot rule out a situation in which the payment for capital calculated according to unified norms absorbs all the profit received by the enterprise or even exceeds it. Hence the need to differentiate payments for capital, the numerous deviations from the rule, and so forth. The very form of payment for capital places certain demands on profitability and, consequently, on price setting: prices cannot be lower than a certain level that provides for minimum profitability for otherwise it becomes impossible to withdraw payments for capital.

Thus payment for capital envisions certain limits to price reduction and centralized regulation of profitability not only for the branches, but also for the enterprises (the establishment of a "normative of profitability" in the price) which affects the general price level. To be sure, in branches where the level of profitability is considerably higher than the payments for capital, this financial form in and of itself does not impede price reduction, but one must keep in mind that it is precisely in these branches that the payment for capital is augmented by the previously planned "free residual profit" and the turnover tax.

The income tax from profit, as distinct from payments for capital, does not require preliminary regulation of profitability and as distinct from the turnover tax it is not linked directly to the price level. A reduction of prices for goods for industrial purposes, if it does not reduce the income of the sellers, increases the incomes of the buyers and thus the overall sum of income tax accumulated by the budget does not decrease. Further, a price reduction does not necessarily mean a reduction of the overall income of the supplier: because of the price reduction he can expand sales, avoid overstocking and losses and, consequently, increase rather than reduce the sum of profit. Consequently revenues of income tax for the budget also increase.

The income tax from profit as a form of deductions into the budget (as distinct from turnover tax, "free residual profit," and payments for capital), without limiting either price reductions or the initiative of the enterprises to update products, basically provides for a correspondence between the interests of the budget and those of the enterprises, the ones that pay the tax, in increasing profitability and profit.

Of course the correspondence of interests cannot be absolute. The time of circulation of production capital and circulating capital differs in various branches and is subject to several fluctuations within the year and, consequently, product sales and profit revenues of enterprises comprise a process that takes place with a certain amount of irregularity. Budget interests require uniform,



regular income revenues that are guaranteed against any fluctuations, and the paying enterprises are interested in having deductions be made into the budget as the actual profit comes in (that is, irregularly).

At the present time stability and regularity of budget income is achieved, first, by deducting into the budget tax from circulation in the wholesale sector of commodity turnover, that is, before the goods are sold to the consumer and regardless of whether or not they are sold; second, through deductions into the budget of payments for capital and other payments from profit regularly twice a month, regardless of the circulation of the funds of the given enterprise and the actual profit that is received. Thus the business actually advances money to the budget and the economic sources of this advance are mainly circulating capital of the enterprise. (Footnote 1) Circulating capital is taken away from the enterprise regardless of whether or not it has actually been released, and also regardless of the financial position of the enterprises. A shortfall of circulating capital in the enterprise is covered by growing credit investments. In the event that the commodity is not sold but profit has been received, the sums of turnover tax and profit deducted into the budget have no material support but nonetheless they remain in circulation.

When preparing for the Economic Reform of 1965 it was suggested that the overall increase in profitability would make it possible in the near future for businesses not to have to advance money to the budget, but these assumptions were never justified.

In our opinion, there is an objective need for a special mechanism that provides for stability of incomes into the state budget and, consequently, it is impossible to abolish the existing mechanism which performs this function without creating a new one to replace it that is more efficient and is free of the shortcomings discussed above.

First of all, let us formulate two questions: 1) in principle, from what source does one cover the budget's temporary need for additional money which arises because of irregularity in the receipt of ordinary income; 2) from what source are these needs finally covered now?

The financial reserves of the national economy are liberated circulating capital in monetary form, fixed capital and accumulated income, but the credit and banking system is the reservoir for accumulating all financial reserves. It is precisely bank notes (value in monetary form accumulated in bank accounts) that can and should be the source of money that guarantees stable, continuous receipt of income into the state budget.

One could object to this that the sources of bank credit are used fairly intensively and people even raise the question of using them less instead of placing another load on them—covering the irregularity of receipts of

income into the budget. But one must keep in mind that the very strain on credit resources is caused by certain conditions, in particular, the systematic removal from enterprises of some of the circulating capital in order to fulfill commitments to the budget. Now let us try to answer the second question: what in the final analysis is the actual source that provides for stability of budget incomes? As was already said, the shortage of circulating capital at the enterprises (as a result of deducting it into the budget) is covered by bank credit. Herein, apparently, lies one of the reasons for the increased proportion of credit sources in the formation of circulating capital. This means that if the immediate financial source that provides for stability of budget incomes is circulating capital of the enterprises, the final source for covering these needs are the resources of the credit and bank system.

Thus the currently existing system of transfers into the budget actually presupposes a mediated, "roundabout" financing of the budget from resources of the credit system. In our opinion, as long as such financing is needed, one should envision the possibility of direct short-term interest-free loans for the budget from the reserves of the Gosbank, bypassing such an "intermediate unit" as the withdrawal of circulating capital. Thus one would be able to achieve a number of advantages over the existing system of transfers, namely: it would be possible to limit ourselves to transferring into the budget the proportion of the actually received profit that is established by law which is enough to cover the needs of the budget as a whole during the course of a particular period of time; to refrain from withholding various funds of institutions and enterprises and deducting into the budget unsold sums or circulating capital. All this would make it possible to avoid disturbing the course of production at enterprises and would contribute to strengthening independence and responsibility of enterprises and stimulating economical utilization of resources. The demand for bank credit and the "pressure" from enterprises and associations on the credit system would decrease. Resources of the credit system would increase through incomes and monetary funds accumulated by the economy and thus there would be greater possibilities for the bank to directly finance (extend credit) the state budget. The financial system in the national economy is becoming clearer, more predictable and, consequently, more controllable. There will be a clearer delineation between the processes of the formation and movement of circulating capital, financial funds of the enterprises, and budget resources. The independence and efficiency of the work of credit institutions will expand, which will make it possible to place greater responsibility on the enterprises for maintaining circulating capital and be more selective in providing credit for the national economy, and it will also be possible to strengthen the cost-accounting basis in the activity of the banks.

In the economies of capitalist countries the financing of the state budget from resources of the credit and banking

system has become immense in scope. But in the capitalist society the interrelations between the bank and the state budget (within the framework of the system of the national debt) are inevitably exploitative in nature: they serve as a mechanism for using banks' capital to exploit the masses of rank-and-file taxpayers who end up paying interest on the national debt.

In a socialist society the necessary financing of the budget by banks should be principally different in nature. The indebtedness of the budget to the banks should be limited to the amounts and time periods of temporary fluctuations of ordinary incomes into the budget and be paid back without interest. This reflects the advantages of the socialist banking system and planned management of its work.

The independence of enterprises and their interest in economical utilization of resources are limited not only by the forms of withdrawal into the budget, but also by systematic redistribution of circulating capital, profit and capital investments among the enterprises that is carried out by the ministries and departments. This redistribution is carried out both in the form of direct withdrawals and nonreimbursable financial assistance and through differentiation and constant revision of the normatives for deductions into incentive funds and funds for the development of enterprises with the help of differentiation of normatives for profitability included in the prices.

The objective cause of interbranch and intrabrand redistributions is the varying level of needs of the branches and enterprises for capital investments and circulating capital caused by the varying rates of technical development, differences in the degree of satisfaction of the demand for their products, and so forth. Consequently, the accumulations and their utilization far from always coincide in place and time. Moreover, the fluctuating capital that is released in monetary form does not always continue its movement within the framework of the circulation of funds of the given enterprises. The mobility of production capital in monetary form makes it possible for the society to concentrate efforts on the most important areas of technical progress and efficiently expand the production of various kinds of products in keeping with the needs of the population and the national economy.

The negative consequences in the national economy are caused not by the actual redistribution of funds between the branches and enterprises (such redistribution is necessary), but by the forms in which they are carried out: budget and administrative withholding, individualization and constant revision of the normatives, and nonreimbursable financing from the budget or ministry funds.

In economic literature one finds repeatedly the suggestion of achieving stability of the normatives that are established for the enterprises. In our opinion, this task

can be carried out only at the level of the society as a whole: a stable normative that could become a law is the established norm of income tax. Normatives established individually for each association and enterprise that are called upon to solve the problem of redistribution of accumulations among branches and within branches in keeping with the needs of capital investments and the increase in circulating capital by their very nature cannot be stable: for the needs whose satisfaction the normatives for distribution of profit are intended to regulate are in themselves changeable.

Are other forms of redistribution of financial funds, circulating capital and accumulations possible? There is an objective form of distribution of funds and accumulations among enterprises that does not violate their independence, interests or responsibility—it is long-term and medium-term credit. To be sure, at the present time the role of this form of redistribution is clearly inadequate, apparently because the function of redistribution of funds among branches and within branches has been taken over by the financial system, the ministries, and the departments. In order for credit to become the main form of redistribution of accumulations remaining with the enterprises, it is necessary to introduce certain changes into the credit and financial mechanism. It is apparently necessary to prohibit administrative redistribution of funds assigned to the enterprises (which creates for the enterprises an objective possibility and elementary interest in saving financial resources) and to introduce the payment of interest on accounts of enterprises (which will significantly increase their interest in savings and will slow down ineffective capital investments). At the same time it is necessary to stipulate the purposes for which the enterprise can expend funds received as interest on investments. In our opinion, these funds should be used exclusively for production purposes, for example, for the assimilation of new products, modernization of production, and so forth.

Activating the role of credit in redistributing the capital and accumulations left at the disposal of the enterprises will make it possible to concentrate budget funds on solving the most important scientific and technical problems, on creating new productions, on assimilating new regions, and so forth. In order for the credit system to cope with the growing tasks, it is necessary to have a significant influx of money into bank channels. Such an influx, it seems to us, could be provided by refraining from administrative and budget withholdings, utilizing financial resources economically, and increasing the overall profitability in the national economy.

Moreover, it is necessary to have a certain restructuring of the credit and monetary system itself so as to give it more balance and elasticity.

The need of the enterprises for bank loans depends directly on the movement of circulating capital and their release from circulation in monetary form or, conversely, on their being "tied up" in circulation in the form of

production stocks, incomplete production, and stocks of prepared products. The shortage of circulating capital causes an unplanned increase in the demand for credit, which leads to expansion of the credit in excess of the limit which is determined by the real credit resources.

The question of payment credit must be especially discussed. It is granted for accounts between enterprises and the demand for payment credits is equal to the need for national economic circulation in money or accounts (as distinct from the need for additional funds) and therefore payment credit can be granted not against money accumulated by the bank, but through noncash monetary certificates issued by it. The volume of payment credit granted to the national economy should be determined by the amount of money and circulation (cash or noncash) necessary for selling and distributing the social product. The time period for paying back payment credits should be limited by the speed of payment circulation. But in reality the time period for paying back payment credit which even before 1979 exceeded the speed of payment circulation and amounted to 30 days, in 1979 was increased to 60 days, and under the conditions of the large-scale experiment it has been increased to 120 days, which corresponds more to the time of circulation of circulating capital than the time of payment circulation.

Thus one can state that at the present time there is no clear-cut delimitation between the credit intended for forming circulating capital and that for satisfying the needs for payment funds: Some of the payment credit is used in the formation of circulating capital. As a result, the mass of noncash money issued by the bank actually depends on the dynamics of circulating capital and not on the needs of the national economy for money in order to sell and distribute the value of the products that are produced. This makes the monetary system not elastic enough and makes it dependent on possible negative processes (for example, having circulating capital increase more rapidly than production). But if payment credits are immediately strictly limited, irrespective of other measures, this will place many enterprises in a difficult financial position and will cause difficulties in the payment circulation, increased indebtedness, failures to pay, and so forth.

The overall restructuring of the economic mechanism should eliminate the tendency toward slowing down of the circulation of circulating capital, excessive demand for credit, and so forth. But in individual areas of the national economy it is always possible and inevitable that there will be fluctuations and declines in the dynamics of circulating capital, in the demand for credit, and in the need for means of payment. The credit system should not react to these fluctuations automatically by expanding the mass of state payment funds (this leads to disturbance of the monetary circulation); nor should it react with a rigid refusal of credit (this leads to disturbances in payment circulation and difficulties in production and sales). Consequently, the existing credit and

account mechanism should be augmented by an element that would make it possible to react flexibly to the economic situation in individual areas of the national economy, without automatically expanding the overall mass of payment funds and not refusing to give enterprises justified credit assistance.

This element could be short-term payment commitments from the enterprises themselves (bills of exchange), which within the framework of the established time period could serve as a means of circulation and payment in intrabusiness circulation (although it would not be a statewide means of payment that would have to be accepted) and they could also be the right to issue payment commitments (strictly in keeping with the movement of commodity values) would be responsible for paying them back promptly. Important results could be achieved this way. Responsibility for unauthorized expansion of the mass of payment means (in one measure or another, in one section of the national economy or another this is inevitable) would be borne by the state monetary system and the enterprise whose economic circulation brought about this expansion. The state system of credit and monetary circulation would be relieved of the automatic functioning and would acquire the necessary elasticity, without which it is impossible to have actual and not formal functioning of credit. Rejection of automatic credit makes it possible to repeatedly satisfy demands for the introduction of cost accounting into banking, activating the work of local bank institutions, balancing their active and passive operations, and so forth.

Circulation with bills of exchange and accounting with them existed in the Soviet economy before 1930. As we know, the credit reform carried out in 1930 stipulated complete elimination of commercial credit, circulation with bills of exchange and accounting with bills of exchange and the corresponding expansion of direct bank credit. In keeping with the provisions of the credit reform the Gosbank had to supply credit directly to the organization that needed the credit.

We must keep in mind that the credit reform of 1930 was prepared for conducted during a period when it was intended in the near future to completely eliminate commodity and monetary relations, including credit, and replace these relations with direct distribution, when noncash transfers were regarded not as a movement of money that served to sell products and distribute their value, but only as formal accounting operations. The reform presupposed the elimination of mutual indebtedness of enterprises and all kinds of indirect credit. This never happened in practice.

When solving the problem of the organization of credit under modern conditions it is necessary to pay attention to the fact, in the first place, that mutual credit among enterprises exists in practice in the form of debtor and creditor indebtedness and, in the second place, bank credit is far from always direct, and in reality indirect

credit exists as well (namely when bank credit makes up for shortages of circulating capital caused by debtor indebtedness) and, in the third place, noncash deductions of money to bank accounts are real money movement (just as cash monetary circulation is) and, consequently, expansion of bank credit to one degree or another leads to increasing the mass of money in circulation.

The circulation through bills of exchange will make it possible to give the movement for mutual indebtedness of enterprises certain forms established by laws and will make it possible to have a clearer idea of the connection between commercial credit (mutual indebtedness of enterprises) and bank credit and, consequently, to control this connection to a greater degree. Finally, the introduction of circulation through bills of exchange will make it possible to significantly reduce the volume of direct bank credit and, consequently, the mass of non-cash money in circulation. This reduction can take place, in the first place, in connection with the fact that far from every bill of exchange should be taken into account by the banks (some of the bills of exchange, and possibly most of them, should not be taken into account by the banks) and, in the second place, in connection with the fact that the bills of exchange taken into account by the banks before they are submitted or accepted for payment should go through several monetary cycles and serve for several commercial transactions.

The question of the expediency of utilizing bills of exchange for circulation and accounting for them has been raised in economic literature, but there has been no widespread response. It seems to us that this question should be raised for discussion again and a practical solution should be found.

In order to restructure the credit and finance system it is necessary to overcome the major shortcoming that is typical of the functioning of all its elements: the rigidity, the lack of elasticity, the inability to react quickly to changing economic conditions. The financial system does not have the capability of reacting flexibly through changes in the level and the uniformity of incomes of enterprises and associations and therefore it is forced to withdraw unutilized financial funds and some of the circulating capital. The system of credit and monetary circulation is forced to satisfy the growing demand of the economy for credit investments, regardless of how this is reflected in the correspondence between loans and the sources of them or the relationship between the mass of money in circulation and the need for money. Intra-branch mobilization and redistribution of accumulations and the release of funds at the present time in the majority of branches can be achieved only through direct administrative redistribution or with the help of normatives that are always being revised.

The rigidity of the existing credit and finance system and its inability to react flexibly to the changing economic situation are brought about by the fact that it lacks a

number of necessary financial and economic forms that would provide flexibility and elasticity in the functioning of the entire system. Namely, there is practically no mechanism for credit redistribution of accumulations or released funds among branches; there is no credit mechanism for drawing part of the accumulations and funds into the channels of the state budget; and, finally, there is no mechanism that makes it possible for the bank system to react flexibly to the demands of the economy for credit and thus maintain a correspondence between loans and sources of credit, payment credits and masses of money in circulation.

The restructuring of the finance and credit system should provide for:

stable incomes into the state budget;

independence of enterprises in disposing of the funds and accumulations allotted to them;

the necessary redistribution of accumulations among branches and within branches;

balance between loans and credit resources, stability, and elasticity of monetary circulation.

None of these goals should be achieved at the expense of another. Moreover, the credit and finance system should not be contradictory to the tasks of price setting. In order to achieve these goals it is suggested:

to introduce an income tax on profit, having abolished the turnover tax, free residual profit, payment for capital and so forth (retaining, however, rent payments). Profit tax does a better job of stimulating the work of the enterprises and, moreover, as distinct from turnover tax, it does not depend directly on the price level (profit can increase while prices are decreasing and if because of decreased prices one payer loses the tax—the seller, the other payer, the buyer, gains). As distinct from payment for capital, the income tax for profit does not require special regulation of the level of profitability. Thus the introduction of the tax on profit is a necessary condition for the functioning of a flexible system of price setting and extensive dissemination of contractual prices;

to prohibit legislatively the withdrawal and predistribution of circulating capital, financial funds and profit left at the disposal of the enterprise;

the funds of enterprises that are kept in accounts in banks that are guaranteed against any withdrawals, should bring their owners an interest that approaches the level of the minimum permissible profitability of production expenditures. Thus a mechanism will be created for the redistribution of accumulations and released funds through the mediation of the credit and bank system;

to create anew the system of regulation of commercial credit, including circulation with bills of exchange and accounting with bills of exchange. The interaction between bank and commercial credit will give the necessary flexibility to the credit and monetary mechanism and will make it possible to selectively grant bank loans, reduce payment credit, and reduce the mass of noncash payment funds in circulation;

stability of revenues into the state budget can be achieved not through forcing surplus payment funds into the economy or removing circulating capital from the economy, but by using the reserves of the credit and bank system—that reservoir of accumulated and temporarily free financial funds of the economy. Budget borrowing from the reservoir of the credit and bank system can assume the form of direct interest-free credit for the budget through the Gosbank. Then the financial agencies will not need to withdraw the circulating capital from the enterprises under the guise of regular payments, and the credit system will not have to make up for these withdrawals through payment credit. The possibilities of the bank system to “amortize” the inevitable irregularity of revenues of income tax for profit will increase because of the overall increased possibility of withdrawal through payment credit and the reduction of direct bank credit for the economy.

Improvement of the credit and finance system is a necessary element of the overall restructuring of the economic mechanism in keeping with the decisions of the 27th CPSU Congress.

#### FOOTNOTE

1. The negative consequences of such a system of deductions are shown in the article by N. Fedorenko, V. Terlamutrova and N. Petrakova, “The Interconnection Between Physical and Value Indicators in the Economic Mechanism,” *KOMMUNIST*, No 12, 1980.

COPYRIGHT: Izdatelstvo “Nauka”, “*Ekonomika i organizatsiya promyshlennogo proizvodstva*”, 19: “On Bills of Exchange and Commercial Credit”]

[Text] As distinct from bank credit, in which banks offer enterprises of industry, trade, and other branches of the economy in the form of certain sums of money, the enterprises themselves grant commercial credit to one another in the form of goods and services for which they go into debt. The enterprise that has received the goods and services on credit gives the enterprise that granted the credit a payment commitment (bill of exchange) according to which it must pay a certain sum of money at a particular time. The enterprise that has received the bill of exchange can, without waiting for its repayment, use it for accounts with its supplier (if it agrees to accept this bill of exchange in payment for its commodities). In this case the right to receive money for the bill of exchange goes to the other enterprise, and the bill of exchange serves not for one but for two commercial

transactions. This same bill of exchange can be used for a third, fourth, fifth commercial operation and so forth. Thus in the sphere for intrabusiness circulation the bills of exchange are a special kind of “commercial money” that replaces cash. The movement of bills of exchange as “commercial money” is called bill of exchange circulation.

If an enterprise that has received a bill of exchange in payment for its goods or services is in need of cash money (for example, for the payment of wages) it can sell the bill of exchange to the bank (of course, if the bank agrees to purchase it, that is, if the enterprise that issued the bill of exchange has adequate financial resources). In this case the right to receive the sum of money for the bill of exchange shifts to the bank. The operation of purchasing bills of exchange by the bank is called accounting with bills of exchange. During the course of this operation the bank charges a certain interest on the sum of money due under the bill of exchange accounting interest.

The bank, which has the right to issue cash money, can in the process of accounting for the bills of exchange issue and put into circulation more masses of money, using them to purchase bills of exchange. The bills of exchange that go into the hands of the bank serve to provide money for them for they show that putting the money into circulation was preceded by series of commercial transactions and, consequently, the money issued by the bank will not be surplus for national economic circulation and its issuance was caused by the economy's need for additional masses of money. Moreover, the sums of money issued by the bank in the process of accounting for bills of exchange should after a certain period of time be returned to the bank as a result of payment for the debts under the bills of exchange. The enterprises that issue the bills of exchange use their property as collateral for prompt payment. Thus commercial credit can serve as a basis and foundation both for bank credit and for monetary circulation.

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#### Wholesale Trade Organization Examined

18200191c Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87  
pp 22-30

[Article by B. D. Belkin, doctor of economic sciences, Commission for Study of Productive Forces and Natural Resources under the Presidium of the USSR Academy of Sciences (Moscow): “Support Point—The Workers' Money”; first paragraph EKO introduction]

[Text] A seminar on system modeling of production, distribution and consumption was held recently not far from Voronezh. EKO took advantage of the fact that

many well-known Soviet economists were gathered in one place and asked them just one question: "How are we to organize wholesale trade in means of production, how can we carry out the task which the party has set more than once for economic science and management practice?"

V. D. Belkin gave a paper at the seminar.

Preliminarily I should note that I shall be speaking on behalf of three people: I shall discuss the research I conducted in conjunction with P. A. Medvedev and I. V. Nit. They are here and will be able to make additions and corrections if I do not get something exactly right.

As is shown by many years of practice and also the experience of the large-scale economic experiment, material and technical supply might be the greatest bottleneck in our national economy and we can "widen it" only through fundamental measures.

Centralized supply of enterprises through funds allotted beforehand was introduced under the conditions of limited material resources as a compulsory measure. But subsequently, as their volume increased, such a method of distribution of resources became a factor in wastefulness and shortages at the same time.

The enterprises' orders for products for production and technical purposes are submitted to the Gosplan, as we know, almost a year before the beginning of the planning period and before the formation of the production program. It is possible to fill these orders only with products of that same set of enterprises. But still there is no reason to assume that the production program will correspond to the orders. Because of the lack of knowledge of the forthcoming production program, in principle the enterprises are not in a position to submit orders that correspond to their future needs.

As concerns the allotted funds, in many cases they include products of enterprises whose startup, even though it was envisioned by the plan, has not been accomplished. The total production program turns out to be less than the totality of orders, and they must be cut. At the same time, in terms of certain positions it is higher than the orders for unnecessary products are produced. Moreover, even the reduced orders are not completely filled. The volume of deliveries with a number of items turns out to be greater than is required for the fulfillment of the production program and with respect to certain others it does not provide for the assignments. Thus for enterprises of the Ministry of the Machine Tool and Tool Building Industry, the Ministry of Instrument Building and other ministries, the year's orders exceeded the demand by a factor of almost 1.5, the allotted funds—by 25-37 percent, and 17 percent more materials were shipped than were needed.

One should not be surprised that the materials that are received exceed the need, for when it comes to funds people generally take what is allotted—frequently for exchange in kind with other enterprises, in order to cover a shortage, at least partly, and sometimes simply in order not to have the funds reduced in the future. Frequently the kinds of products whose total production is sufficient become shortages for certain enterprises (or surplus for others) because of incorrect distribution. A number of kinds of products are temporarily in short supply, and then there is a surplus of them because of the lack of coordination of the time periods for their delivery with the production program of the consumers.

No iterative procedures for coordinating production and industrial consumption, even with the help of modern computer equipment, are capable of helping things, which is shown by the excessive growth of production stocks which is observed under conditions of a shortage. Thus from 1960 through 1985, while the gross social product increased by a factor of 3.8, reserves of commodity and material values increased by a factor of 6.2, which means taking materials worth a total of 174 billion rubles out of circulation. Accumulation of reserves accelerated especially under the 11th Five-Year Plan.

The shortcomings of the existing form of material and technical supply are manifested even more sharply in agriculture, construction, and housing and municipal services than they are in industry.

The unsatisfactory support for construction, along with other factors, undermines the planned startup of capacities and causes a shortage in the delivery of products from these capacities which, in turn, makes it more difficult to provide material resources for production. The imperfection of material and technical support largely causes the excessive volumes of incomplete construction. Thus the existing system of material and technical supply inevitably gives rise to an imbalance and the freezing of resources as well as a shortage of them.

The following aggravating circumstance should also be noted. The existing methods of centralized planning and management make it so that the greater the balance between production and industrial consumption, the less the difference between the structure and volume of reproduction of the planning period and the report period. This contradicts the program instructions of the party that require progressive structural changes and acceleration of socioeconomic development.

It is easier for enterprises and departments to substantiate and "defend" orders that repeat previous requests for materials, and it is less trouble for the Gosplan to control them. When developing the production program the Gosplan, in turn, is forced to be oriented toward these orders, in the first place, in order to satisfy them and, in

the second place, in order not to worsen the imbalance of the plan. Thus the assignments that are envisioned are not provided with material resources.

The obstacles on the path of scientific and technical progress caused by the system of untimely orders are the talk of the town. Inventions and discoveries, their experiment testing and their semi-industrial trial, unforeseen changes in scientific research—all this is impeded by the fact that it is impossible immediately, as the need arises, to acquire the necessary materials and instruments or even to build simple installations and adaptations.

With fund distribution money plays a secondary role. The fact that the consumer does not have any, as a rule, is not an obstacle to obtaining the products allotted according to the fund. At the same time the lack of funds, even when money is available, makes it impossible to obtain these products legally.

The range of ideas about the role of wholesale trade is extremely wide. Some say that it should serve only as an addition to the existing system of funding material and technical supplies. Others think that wholesale trade should fully replace this system. Our idea is closer to the latter. With the exception of a limited list of materials and a narrow range of consumers, all material and technical supply should be changed over to wholesale trade, including direct ties between associations and enterprises.

What does it mean to formally switch over to wholesale trade? It means replacing funds (cards) for obtaining one product or another with money or, more precisely, simply abolishing funding. The mass of "easy" money is increasing more and more these days. The political report of the CPSU Central Committee to the 27th Party Congress discusses the fact that credit has lost its meaning: it is granted almost automatically, frequently the money is not returned, and so forth. With a surplus of money we are unable to abolish the funds and there are not enough commodities for the current mass of money. The volume imbalance is exacerbated by the structural one. Without reducing the quantity of money to the amounts determined by the mass of commodities and without putting prices in order it is impossible to change over to wholesale trade. The shortages of means of production will become even more critical.

The credit and financial reform and the restructuring of prices, it would seem, should precede the changeover to wholesale trade. But this is not the way it is. Why is there such a freezing of resources as one finds today? Under the conditions of unreliable supply, stocks and also money are necessary, for otherwise there will be interruptions in production and idle time. Everything is linked together and therefore it becomes impossible to

have regular credit-financial reforms or reforms of material and technical supply. It turns out that it is necessary at the same time to improve credit and financing, to restructure prices, and to return credit and finances to their normal condition.

Thus we are speaking about a radical reform of the entire sphere of circulation. A truly unique task has been set which has never been resolved previously either in practice or in theory: to achieve both acceleration and increased balance simultaneously. The achievement of balance and the strengthening of commodity and monetary ties will make it possible to put an end to the barter exchange in our economy, to provide for efficient specialization and cooperation and, on the basis of this, to increase labor productivity—the main factor in acceleration. And here is a large field of activity for scholars.

Since questions of a radical economic reform and a changeover to wholesale trade has been placed on the agenda, it is no longer enough to simply criticize the existing situation and analyze the ties with wholesale trade, the credit and finance system, and price setting. Here it is necessary to earmark concrete paths to change. The question might be posed literally this way: what must be done beginning January 1987, January 1988, and so forth?

Further: should the changeover to wholesale trade be a one-time act or should it be gradual? Let us say that we have succeeded in creating a theoretically irrefragable design for a one-time changeover of all enterprises to wholesale trade. Even in this case changes that are not prepared for could lead to unexpected negative consequences. There is, for instance, the psychological factor: our businessmen have come to believe that funds are everything and money is nothing. They have also become accustomed to the fact that it is possible while working poorly to live fairly well off the state. In the restructuring that has been earmarked we need some kind of experimental constituent so that during the process of a gradual changeover the necessary rules and stabilizers will be developed.... Difficult relations could arise between the enterprises that are changing over to wholesale trade and the "environment." The economy must develop in a self-regulating regime and not administratively. When developing the path of reform we have proceeded from those real conditions that exist currently in the national economy.

I have already discussed "easy" money and that the mass of it is increasing more and more. But for wholesale trade we need money that is earned, not easy money, but real money. But where is this money? It turns out that it exists. If enterprises that produce goods for the population do not work for the warehouse but sell their products to the final consumer, they actually live on the money from the population. And this is not easy money, but earned money. And if these enterprises pay for products for production and technical purposes essentially with money from the population, they will not



purchase anything superfluous in wholesale trade: for they have limited amounts of money. Limited to what they receive for the products that are sold. Hence our proposal.

Usually all kinds of innovations in our country have begun with heavy industry. But now it is being suggested that we change over to wholesale trade in means of production with enterprises that produce goods for the population, and not all of them, but only those that are profitable, and sell their products to the consumer. It would be unwise to change over to wholesale trade those enterprises that are working for the warehouse in obtaining money on credit or in the form of subsidies, redistribution and so forth.

How do we arrange it so that the money of the enterprises that have been changed over to wholesale trade is not mixed up with the other money? I think it is necessary to open up a special bank account for them. The money that goes for purchasing products for production and technical purposes (actually, the money of the population and foreign trade association) will be placed in a special account.

Further: it is necessary to provide for unimpeded sales of products from enterprises that have been changed over to wholesale trade. In order to stimulate this, some part of the money they earn should be shared with trade. It could turn out so that these enterprises without knowing that they will be changed over to wholesale trade, have placed a large order for material and technical supplies. But the game should be open and honorable. It must be said that now they would receive supplies not through funds, but at the expense of people just like them, and therefore they could revise their order and adjust it. Subsequently these enterprises should be changed over to cost accounting. They would receive wages according to the residual-result principle, that is, earnings minus production expenditures and payments that are made into the budget.

The enterprise should use practically exclusively its own earned "convertible currency": to order additional equipment, to spend its own money on social, cultural and domestic services, and so forth. Of course this would place these enterprises in favorable, but not easy conditions.

If enterprises that have been changed over to wholesale trade want to produce more products and obtain more equipment they have the opportunity to pay for this with part of their own earned money. As concerns supply enterprises, they will receive money because they will use their internal reserves to produce additional materials and additional equipment for enterprises that have been changed over to wholesale trade? Why will this be advantageous to the suppliers? Because the money received from these organizations were also going to a special account, and the supply enterprises can use it at their own discretion.

What will be the destiny of those enterprises that are working for the warehouse? Some of them will lose out! As the poet said, "The best does not come cheap." It will be necessary to return to the concepts of bankruptcy and insolvency. After all, why do we need enterprises that are working for the warehouse? This means that they must be "cleaned up": restructured, and joined with those that are working well. These enterprises should have a minimum of earnings as a possibility of restructuring and changing over to other products.

After light industry enterprises that produce means of production for producing consumer goods will be changed over to wholesale trade. They will be able to pay off their suppliers with earned money. The investment sphere should be changed over, to a decisive degree, to the credit form of investments, but credit resources should be limited to the real possibility of backing them up.

Even now the main source of credit resources is money from the population—savings deposits. Their total at the beginning of 1986 amounted to 220 billion. But, according to my estimate, approximately 60-90 billion of this were surplus savings, the result of unsatisfied demand. They do not have material support and they will not serve as a credit resource. The changeover to the credit form of investments should teach people to build and also to live according to their means. Then it will be possible to supply the builders under the policy of wholesale trade.

What then will happen in the credit and finance system? Today both credit and budget resources are elevated. The budget receives payments from the planned and not from the actual profit, and from turnover tax—before the sale is completed. The wholesale bases pay it. As soon as they have received a commodity (it makes no difference whether this commodity will be sold), the budget receives the turnover tax. The enterprises that are changed over to wholesale trade will make payments into the budget from the profit that is actually received, particularly the turnover tax—from the sales of their products. They will not be able to exist otherwise: after all, they need something with which to buy products for production and technical purposes.

Prices should be restructured without stopping or even looking forward. This can be done in two stages, first by providing at least a unified level in order to get rid of reduced prices for shortage products and increased prices for surplus products. With normal prices many kinds of products will no longer be in short supply. Then when there is a volume balance it will be possible to arrange a more precise price mechanism, following the line of contractual prices, limit prices, and so forth.

In our opinion, there is no alternative to the proposed path because a dual problem will be solved: acceleration and balance. The additional wages at enterprises that have changed over to wholesale trade are linked to



increased labor productivity and with the residual principle and the possibility of paying real money for the necessary equipment, raw material, and so forth, labor productivity will undoubtedly increase. The incomes of the population will also increase. But both with today's prices and with the reformed prices the commodity mass will outstrip the growth of income in terms of value. That is, with each step of the reform the balance will increase.

It is necessary for the entire complex of measures for restructuring the economic mechanism to be carried out before the end of the 12th Five-Year Plan. Personnel training is extremely important here: they must be retrained literally on the move. Our personnel have not mastered credit and finance methods of management and regulation, and they do not know much about monetary circulation. It will be difficult to teach them, but it is necessary.

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### Seminar Paper on Wholesale Trade Discussed

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[Discussion by S. S. Shatalin, Institute of Economics and Prediction of Scientific and Technical Progress of the USSR Academy of Sciences (Moscow), Ye. A. Khrutskiy, doctor of economic sciences, Central Economics and Mathematics Institute of the USSR Academy of Sciences (Moscow), Sh. B. Sverdlik, doctor of economic sciences, Institute of the National Economy (Novosibirsk), and others; materials prepared by Yu. P. Voronov and V. G. Rubenchik: "Discussion of the Paper"]

[Text] S. S. Shatalin, Institute of Economics and Prediction of Scientific and Technical Progress of the USSR Academy of Sciences (Moscow): Today we are holding a discussion on an extremely crucial topic. Advancement in the implementation of the radical reform of the management of the entire economic mechanism depends largely on the solution to the problems that we are bringing up for discussion. The question of wholesale trade in means of production was first raised in the decisions of the September (1965) Plenum of the CPSU Central Committee. Then this was considered a natural condition, without which the Economic Reform could not take place. Nonetheless, more than 20 years later we have still not managed to realize this idea.

Today we are speaking about a radical restructuring of the economic mechanism. Without wholesale trade this work will be only a beautiful dream and nothing more.

For both self-financing and cost-accounting [khozraschet] presuppose that you will be able to buy any product at any time that is suitable and at normal prices without interruptions. But so far this is not the case. We need energetic efforts so that wholesale trade in means of production will be finally introduced.

Here it is possible to make a mistake which we will try to avoid. Sometimes people say that it is possible to set prices in such a way that one can balance the economy without lifting a pencil. Of course we are speaking not about that kind of balance, but about the kind that occurs when the economy is developing at an accelerated rate, the volumes of output are increasing, and quality is improving. It is for this that we must introduce wholesale trade, and certainly not in order to provide for a formal balance with the help of money on the market of means of production and objects of consumption.

We know that the problem of prices can be resolved statistically both in retail and in wholesale: you set a high price and then weed out the ineffective consumers. But the question is how to maintain dynamic, long-term, integrated balance in both the consumption and production sectors. How can one use prices and not simply decisions to carry out investment activity in the national economy? We must not think that as soon as we change over to wholesale trade everything will be wonderful all at once. No, not everything is that simple.

Ye. R. Khrutskiy, doctor of economic sciences, Central Economics and Mathematics Institute of the USSR Academy of Sciences (Moscow): The expression "wholesale trade in means of production" arose in counterbalance to "retail trade in objects of consumption" during a period when it was thought that the distribution of production funds in any other way than with the help of state plans for distribution and the delivery of funds to the enterprises and other organizations was generally unthinkable. Through the efforts of Academician V. S. Nemchinov and his school, the term "wholesale trade in means of production" was given the right to exist and began to be used both in official documents and in scholarly literature (regardless of the actual condition of this process).

But under real economic conditions, which are determined by the predominance of public (and most frequently state) ownership, the objects of wholesale trade cannot be enterprises, roads, sovkhozes, kolkhozes, and so forth for the obvious reason that it is impossible to determine the participants in the act of "buying and selling." Therefore it is natural that the object of wholesale trade can only be products for production and technical purposes—raw materials, processed materials, semimanufactured products, machine tools, other machines, equipment, and so forth. But in this case why speak about "wholesale" trade if one can buy and sell, for example, only one machine tool or, say, industrial byproducts which are now sold to the population in retail in specialized stores?

Consequently, the most acceptable term is "trade in products for production and technical purposes."

When reorganizing the system of material and technical supply, one should delimit the sphere of production and the sphere of circulation of products for production and technical purposes. It is necessary to create supply and sales associations that function on principles of complete and real cost accounting (these could include scientific production associations similar to those in industry). Cost accounting in the supply and sales associations that are created should be oriented not only toward reimbursement for current expenditures, but also toward self-supporting production and self-financing. Receiving well in advance (5 years or more) the absolute sums of mandatory payments into the budget and deductions for higher organizations (or normative for shared distribution of planned and above-plan profit), the supply and sales associations would have a real interest in rapidly and stably increasing their net income, which they would have to use to provide for their own technical and social development.

When arranging the economic mechanism of the new system of material and technical supply, all the essential elements of its functioning are determined directly:

the basic direction of the development of the system—the condition toward which it should strive in the process of its improvement;

the criterion (or totality of them) for the functioning of the system;

legal acts that regulate the activity of the supply and sales associations;

economic normatives that determine the parameters of the functioning and development of the system, and so forth.

During the course of the functioning of the system the central agencies developed certain, mainly economic, parameters (normatives of shared distribution of profit, payments into the budget and centralized funds, and so forth) for the long term. They helped to provide, on the one hand, for increased effectiveness of centralized leadership and, on the other, a greater role and independence for the supply and sales associations and their interest and responsibility.

The functioning of production and supply-sales associations can be schematically represented as follows:

The production associations establish direct long-term economic ties for trade-in products for production and technical purposes that are consumed in sufficiently large quantities (like transit norms). The production associations satisfy their need for small quantities of products through purchases from supply and sales associations. The latter, in turn, purchased products from the

corresponding production associations in large batches so as to have the possibility of selling them to other associations in smaller quantities. Taking into account the fact that all associations strive to obtain high profit, each of them is concerned always to have products in the proper assortment and quality but with normal supplies, for maintaining surplus supplies will reduce profit. This will provide for functioning of the sphere of circulation of products for production and technical purposes that is economical and effective for the national economy.

Sh. B. Sverdlik, doctor of economic sciences, Institute of the National Economy (Novosibirsk): The "raisin" concept of V. D. Belkin is the introduction into economic circulation of the "solidly convertible ruble," which will be circulated in parallel with the ordinary ruble in noncash transactions among enterprises and organizations.

Let us trace the path of the "convertible" ruble using a simple example. Say Leather and Footwear Association A is an ideal object for the proposed experiment. The shoes it produces do not lie on the shelves of the stores, the profitability of production is high, and its financial condition is stable. A special bank account is opened for the association in which are deposited the earnings from sales of products to trade organizations. From these earnings Association A first covers its own production, material, and labor expenditures and settles accounts with the state budget for deductions and taxes. The sum remaining after this is the "convertible currency" which the association disposes of at its own discretion.

Now let us say that our association has decided to increase the output of running shoes, the demand for which is not yet fully satisfied. But in order to do this we need help from enterprises B, C, D and so forth, which would agree, in keeping with their internal reserves, to produce the equipment and materials necessary to the association in exchange for "convertible currency." Let us assume that all these enterprises are just as irreproachable as the ideal Association A—it is simply a utopia, for in this case why build a barrier and introduce the "convertible" ruble? And here is Enterprise B (or some other one) which cannot find the internal resources for satisfying all the planned deliveries but still it is willing to find these reserves for above-plan deliveries to Association A. Why? Because it is in debt up to its ears, its current account has been attached because of all the overdue claims from clients, the bank has stopped issuing credit, but this money in the special account can be disposed of at its own discretion, possibly even for awarding bonuses for those same negligent workers who led the enterprise down the road to financial ruin.

The matter does not end here. Intermediate suppliers of Association A will purchase above-plan products from their supplier, and so forth. In the final analysis the special accounts will be a convenient and legal loophole for building up "collective egoism" of the enterprises,

which will conceal their incomes behind it to the detriment of the interests of the creditors that supply products under the planned policy.

The experience in monetary reforms here and abroad show that the replacement of one kind of money with another and parallel circulation of "strong" and "weak" currency in and of themselves do not solve the problem of stabilization of the economy unless the reasons for the destabilization have been eliminated. Thus the Chervonets issued by the bank in 1922, which were backed by gold and currency, did not stabilize the monetary circulation since they continued to issue Sovnaks to cover the budget deficit. The elimination of the budget deficit in the second half of 1924 created conditions for removing Sovnaks from circulation and replacing them with full-value bank notes, and this, in turn, became a powerful factor in the stabilization of commodity and labor relations.

The problem of commodity and monetary balance cannot be solved by half-measures like "special" rubles and special accounts. To create benefits for someone in disposing of income is the same thing as permitting certain means of transportation to move along the left side of the street. It is necessary to use strict measures of the financial and credit policy to remove the desire of the enterprises to store up surplus supplies of goods that are in short supply and force them to turn over to their state fund all their surplus commodity and material values, close off all channels for the payment of unearned money, put a stop to charity with respect to economic managers and labor collectives that are debasing state funds—in all this one can see the impetus for the normalization of commodity and monetary relations.

Ya. V. Radchenko, candidate of economic sciences, Moscow Institute of Administration imeni S. Ordzhonikidze: The question "to be or not to be," in my opinion, is no longer to the point. If one says "a"—that self-financing is necessary, including for expanded reproduction, there must also be a "b"—for these conditions one needs wholesale trade. Otherwise the enterprise cannot spend the money it earns because of limitations on funding.

Does one change over to wholesale trade gradually or all at once? There are objective restrictions here. For no undertaking can be carried out in a single moment. There is a transitional process: for large measures it takes 1.5-2 years until all the "rules of the game" are developed: instructions, methods, and so forth. The transition process should be controlled. To do this it is necessary to have a program and network schedules that make it possible to coordinate the work of central economic departments. In no case should these documents be the product of formal paper shuffling. Incidentally, the idea that juridical laws should not be created but should only register objective flaws was expressed in his day not only by Saint-Simon but also by Marx, and before him—the noted Russian state figure M. M. Speranskiy.

What will the enterprise want to acquire through wholesale trade? It is not very likely that it will be the equipment it needs for producing products that are planned centrally. More likely it will acquire equipment for products that will be produced advantageously. And for products that are planned centrally it is necessary to leave channels for centralized funding.

When will the enterprise be able to do something for itself? Obviously that will be in cases when there is a reserve of capacities or it can create one. Then those additional capacities which the enterprise will create by acquiring means of production should not be used according to instructions from above. The collective itself should be authorized to decide how these capacities are to be used.

Will it not happen that the enterprises will develop "in the wrong direction" and depart from the target direction and the branch specialization? I think that in principle specialization is the main line of development and diversification is an exception, but under certain conditions it is necessary and useful as a supplement to specialization. For there are cases in which specialization is ineffective or does not make it possible to fully realize the enterprise's potential, for example through comprehensive processing. It seems that if a proportion of the products do not correspond to the branch designation and as a result of this self-development the enterprise becomes larger than envisioned by its profile, it is also possible to change the branch to which the enterprise belongs. Then the corresponding ministry should make new investments for compensation for the withdrawal of the enterprise from another branch.

P. A. Medvedev, candidate of physics and mathematical sciences, MGU: It is natural that everyone is disturbed by the destiny of unprofitable enterprises. It is clear that these enterprises should ultimately disappear. There are two paths: they must either raise themselves up or go bankrupt. Our suggestion to begin the reform at profitable enterprises of Group B, in particular, provides an opportunity and a stimulus for backward enterprises to correct themselves. To begin the reform with the bankruptcy of enterprises that have been changed over to the new conditions means to fail before getting started. But, in principle, as V. D. Belkin said, we will have to return to the concept of bankruptcy. This was discussed directly at the 27th Party Congress: "It is important to unwaveringly implement the principle whereby enterprises and associations are completely responsible for working at a loss. The state does not bear responsibility for their commitments. This is precisely the essence of cost accounting."

What awaits the workers of enterprises that have gone under? They must be given assistance in finding new work and during the time while they are looking they should be granted a reasonable subsistence minimum of money. What can one use for trading if all of the products that are produced are assigned ahead of time to

consumers through the delivery plans? Our work with an immense amount of statistical material has shown that the existing opinion greatly exaggerates the directive nature of our directive planning. Actually, a recognition that the existing form of centralization of management, which is based on designation planning, is more a nominal than a real lever for influencing mass economic practices caused us to begin to look for the proposed concept of the reform. In order not to get bogged down in details, I shall simply say that I am confident that all products assigned ahead of time to consumers completely contradicts the fact that the total supplies at enterprises, both relative and absolute, are increasing more rapidly than the national income is. For nobody knows for whom or for what the products in the warehouse were made. A considerable proportion of the stored values gradually lose their value. And so much property does not perish gradually! Look at any construction site. There are so many mountains of forgotten concrete, crushed concrete slabs, bent pipes, and broken glass! So many good construction materials are left on the ground after the completion of construction! We have more than enough reserves of material resources for wholesale trade according to the plan we propose. The same thing can be said about labor resources: the possibility of honestly earning an additional ruble in one's workplace motivates many people to shorten their smoke breaks and economize on raw material.

D. N. Kazakevich, doctor of economic sciences, IEiOPP of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): One respected economist said: Why do they train so many economists in the country's VUZes if we use noneconomic methods for management? But they are trained accordingly: we do not have enough specialists in such refined areas of economics as the finance and credit system, the monetary system and the system of material and technical supply, and supply from the standpoint of changing over to wholesale trade in means of production. This shortcoming is inevitably reflected when changing over to the new economic mechanism.

I agree with the basic directions of the reform of material and technical supply proposed here and with the fact that it must be carried out in complex with the reform of the finance and credit system and price changes. But the idea that it should be gradual needs discussion. It seems that initially one must have a detailed model of the new economic mechanism and an all-embracing procedure for changing over to it that is calculated in time in all spheres of the national economy. It would not hurt to have a detailed study of the experience in conducting radical economic reforms in other socialist countries.

What has been said certainly does not mean that I am suggesting spending a long time on discussion. We need a specially created work group which would immediately engage in the development of a comprehensive model of the new economic mechanism and also alternative variants so that it would be possible to select one of them. The elements of the economic mechanism would have to

be introduced immediately so that the next five-year plan could be developed with an orientation to the new conditions for management of the economy. And at the center of the restructuring of the economic mechanism, of course, should be the finance and credit system, price setting, and material and technical supply.

Economic science at one time set forth various proposals which are useful now. But several years ago it was suggested that we plan not the growth but the final output. And this is a necessary condition for changing over to the new economic mechanism! What does it mean "for each level—its own final product"? For a metallurgical combine it is only that which goes outside the combine, which it turns over to the national economy. The internal circulation within the combine should not interest planning agencies at all. The same thing is true for the branch and so forth. The changeover to planning the final product at all levels brings us close to the new system of material and technical supply.

An important idea was advanced in 1964 by Vasiliy Sergeyevich Nemchinov: the idea of cost-accounting planning, that is, the changeover from the plan-directive to the plan-order. The latter presupposes that the formation of the plan for the national economy begins from below. From the lower levels come alternative variants which include also ties among the enterprises. And the task of the agencies for planned management is to evaluate these variants from the standpoint of the national economy as a whole and select most effective ones. All this will help to establish long-term economic ties among the enterprises on the basis of wholesale trade in means of production.

Finally, there is the idea that was publicized by economists after 1966. This idea is not a unique kind of material and technical supply, but a multichannel system whose basis is wholesale trade in means of production. The experience of Hungary and Bulgaria shows that the system of wholesale trade and the system of material and technical supply on the whole has many channels. Here there can be long-term direct ties among enterprises, which conclude agreements among themselves without the participation of any supply and sales agencies. But for many means of production it is expedient to have large cost-accounting enterprises for supply which engage in batching and have modern equipment and means of information. For a time it is possible to retain a certain part of the funded supply (this is apparently unavoidable under the new conditions). For it is difficult to imagine that tomorrow everything will be plentiful even if we balance supply, demand, prices and so forth. And this cannot be, since under the conditions of scientific and technical progress there will always be new means of production which will inevitably be in short supply at first. It would be stupid to reject the possibilities of our system to regulate their utilization in a planned way for the most important purposes.

V. M. Polterovich, doctor of economic sciences, Central Economics and Mathematics Institute of the USSR Academy of Sciences (Moscow): I agree with the basic idea of V. D. Belkin to the effect that a radical reform should take place gradually. But it seems to me that the method selected for realizing this idea was not the best. Why is it necessary to work gradually? Mainly because, in spite of the numerous shortcomings of the existing economic mechanism which has been noted here, various of its elements are still adjusted to one another. The illogic of one element is unexpectedly compensated for by the illogic of another one. It is necessary to be circumspect when centrally changing the rules of economic influence that has been formed as a result of a long process of development.

A second important circumstance: the current economic managers are poorly prepared for work under essentially new conditions and they need time to learn.

The most promising path to gradual (and radical) reorganization of the economic mechanism, in my opinion, consists in the creation of a "mixed" system for the functioning of the economy. Such a system should include two spheres. The first is the sphere in which at first we mainly retain the currently existing rules. The second takes advantage of those new principles that were discussed by V. D. Belkin: flexible prices set by the enterprises during the process of trade, the residual principle of calculating remunerations for labor, and so forth. Certain elements of such a mechanism have already appeared within our economy and it is important to give them the opportunity to develop more rapidly. I have in mind first and foremost the contractual prices for high quality items of light industry. These prices have been used in the circulation of goods from light industry since 1980, although on a small scale (about 1.5 percent).

Within the framework of the "mixed" system all enterprises receive the basic opportunity to participate in the new mechanism and, consequently, to learn to work according to the new rules. The existence of the planning sphere creates a certain stability and greater flexibility is achieved because of the above-plan sphere. Theoretical research on the "mixed" mechanism shows that flexible prices of the second sphere even with a small volume of goods produced in it can provide important information concerning the degree of shortage of resources that is so necessary for managing the planning sphere. The development of the reform in this direction would make it possible to establish an expedient scale for production within the framework of each sphere and to find a reasonable measure of centralization and decentralization of management.

In conclusion I should like to emphasize that it is necessary not only to change the economic mechanism, but also to be concerned about "changing the mechanism for changing the mechanism." The real rules for the functioning of enterprises are largely a continuation of a

flow of instructions uncontrolled from a unified center in which new ideas frequently drown. This is a very complicated problem, but one can hardly be successful without solving it.

I. L. Lakhman, doctor of economic sciences, Central Economics and Mathematics Institute of the USSR Academy of Sciences (Moscow): The development of wholesale trade in means of production has become an urgent necessity. But with such a complicated matter one cannot break down old forms immediately, not before the new ones have demonstrated their ability to replace them completely. But the proposed gradual changeover, it seems to us, is not altogether successful. Apparently it would be more expedient to change individual enterprises over to wholesale trade and offer each one the right to freely sell its own above-plan products at flexible prices by making direct agreements with associated organizations. The contours of such a system of economic interrelations can be presented in the following form.

For balance in the state plan of the purchasing funds of the population and the commodity resources, control figures should be set for the ministries and departments for the volume of products produced. On the basis of these, control figures can be "sent down" to the associations and enterprises. When developing its production program the association (enterprise) should take into account as completely as possible the orders from trade organizations and enterprises, and the degree of accounting in fulfilling orders should serve as a primary criterion for evaluating the activity of the industrial facilities.

The sum of orders accepted for commodities at stable prices comprises the basic plan of the association (enterprise). In addition to the basic plan each enterprise has the right to organize the output and sales of commodities at contractual prices. The production of these goods, in the first place, can serve as a source of commodity output in order for the enterprise to reach control figures in the event that the basic plan as the sum of orders from trade organizations turns out to be less than the control figures. In the second place, trade at contractual prices should serve as an effective stimulus for accelerating the process of updating the assortment of consumer goods and should create interest in expanding the output of products of high quality that are in great demand among the population.

Enterprises that produce consumer goods establish the corresponding contractual relations with their associated organizations—the suppliers of means of production—and they, in turn, establish them with their contracting agents. And so it goes throughout the entire chain of economic ties. I should note again that in all of these cases we are speaking about selling above-plan products at contractual prices, in addition to deliveries at stable prices. The proposed principle, in our opinion, has the advantage that it does not entail a sharp break from the existing system of material and technical supply and

gradually brought the enterprises and associations into free wholesale trade, and it also develops a taste for it among the workers. As these contractual relations develop, they will be able to encompass an ever larger proportion of the products—both means of production and objects of consumption. It is clear that no directions and no strict assignments should be established for such economic relations. The main stimulus for their development is material interest. Contractual prices in this respect present broad possibilities. Thus at the present time enterprises that are selling especially fashionable commodities to trade organizations at contractual prices have the right to keep 55 percent of the additional profit for themselves. Such a policy should be extended to all associations and enterprises that produce and sell means of production at contractual prices.

V. L. Perlamutrov, doctor of economic sciences, Central Economics and Mathematics Institute of the USSR Academy of Sciences (Moscow): In 1965 we were all talking about wholesale trade in means of production: we were going to introduce it as the shortages were eliminated for various commodities and groups of commodities. It is now clear that the shortages are not being eliminated, and moreover they cannot be eliminated. With the current broad and liberal issuance of budget allocations and bank loans to the enterprises, the effective demand is steadily outstripping the supply. Regardless of how you increase production there will still never be enough steel, cement, mineral fertilizers, and so forth. The production supplies of the enterprises are growing twice as rapidly as production itself is. About half of the produced social product goes into supplies that become surplus. I think we need a finance and credit reform which would lead to a strict balance between material and monetary resources of the national economy.

Marx wrote in *Das Kapital*: "Prices are loving glances cast by commodities at money...." Under the conditions of a surplus of monetary funds, money is "casting loving glances" at commodities. Thus it loses its capability of being a universal equivalent of material values. And without it there is no trade, even wholesale trade. If there is anything it is commodity exchange. Or distribution according to cards. Incidentally, fund distribution of production capital is also a card type of distribution.

In order to return to trade money is needed. If, as was said at the 27th Party Congress, "credit has lost its real purpose," then first it is necessary to return this purpose: it must become a quick, returnable, and paid source of financing expenditures for cost-accounting enterprises, and then it will be possible to change over to wholesale trade as well. But that is not all.

Again experience teaches us that there can be no authentic cost accounting without self-supporting production and self-financing of expenditures of the enterprises. No matter how we have tried during the past 2 decades to arrange for cost accounting without this, we have never been successful. So many indicators for the planning and

evaluation of the work of the collectives were tried, right down to normative net output. So many fund-forming and even fund-adjusting factors (when forming economic incentive funds) were introduced and abolished—the result did not change or it changed very little. And each time we convinced ourselves: this will work this time....

All the enthusiasts at two enterprises (the Sumy Machine Building Association imeni M. V. Frunze and AvtoVAZ) had to do was try out even imperfect plans for self-financing of the expenditures of the collective and it became clear: cost accounting means self-financing. At the 27th Party Congress it was noted: associations and enterprises are to be changed over to "real cost accounting, self-supporting production and self-financing, and the level of income of the collectives is to be made directly dependent on the effectiveness of their work."

This system creates real responsibility: the amount they earn from fulfilling orders from consumers is the amount they have to live on. This means not only incentive funds and fines, but also wage funds, circulating capital, and funds for the development of production as a whole are determined by the course of the fulfillment of commitments to the consumers that are registered in economic agreements. Here it also becomes burdensome to have excessive, not very mobile supplies in the warehouse and stockpiles in the shops, surplus workers, and worn-out or idle equipment.

I even think that in order to change over to wholesale trade we should first conduct a general inventory of the material values in the economy and reevaluate fixed capital (it would not be difficult to do the latter because of the earmarked revision of amortization norms), get rid of the evermarking unnecessary that is gathering dust, and put things to work or write them off. In a word, like an intelligent businessman—put our house in order and then invite the guests, or begin the reform.

In recent years many branch ministries have been raising the question more and more loudly: return our supply and sales organizations that were at one time taken over by Gosnab and we will sharply improve the supply for the national economy. After many years of reflection they have come to the conclusion that wholesale trade is an empty dream. They are obviously counting on something which will be more convenient and peaceful, although things will actually be more convenient and peaceful with wholesale trade.

Experience, although not prolonged, in wholesale trade is provided by the cost-accounting supply and sales associations of the middle and second half of the 1920's—state syndicates. The all-union textile syndicate under the leadership of V. P. Nogin operated particularly well. On a contractual basis it provided trusts of the textile industry with raw material and other necessary materials, and on the same basis it ordered what should be produced and in what volumes, and so the products of

the trusts. Moreover, the syndicate granted credit for production for its orders and thus strictly controlled and directed the activity of the enterprises. The laughter could not get by with doing only what was simplest and easiest for them. Although they complained, they did what the syndicate ordered. Like a "wholesale merchant" for the society, it represented not so much the interests of the producers as of the consumers. It was necessary to satisfy their needs: the cost-accounting results of the syndicate's activity depended on this.

Naturally, the activity of the wholesale operator is more efficient and economical than the ties between an individual consumer and the same producer. He was responsible for the course of supply not only administratively; he was responsible for promptly sending orders and funds for allotted raw materials, and so forth. He was also responsible for supply economically: he "lived" on a percentage of the circulation of the products that were bought and sold. Because of this situation, and the ties that had been arranged with the manufacturing enterprises (and consumers), the syndicate, with a balanced economy, could prevent the monopolistic position of the producers with their slow reaction to demand and scientific and technical innovations, that is, to the incentive motive and a decisive means of increasing effectiveness.

The syndicate also entered the foreign market. It established prices and had insurance supplies in the event of "interruptions" in production or shipments. In this situation contractual commitments determined the plans for deliveries and the latter, in turn, determined production plans, on which, naturally, the material and technical supply of the syndicate depended. With fund distribution of means of production, unfortunately, this sequence is the reverse: first they order supply and then they find out what and how much to produce, after which contacts are made with the consumers. Incidentally, this is really the "dictatorship of the producer."

This means that experience—according to A. S. Pushkin, the "son of difficult mistakes"—is something we have. The fraternal CEMA countries also have it. We need not think of anything new, we need only apply this experience under modern conditions. Perhaps prices as well—for a specific list of items within the limits of the larger parts of the national economic plan—should be turned over for determination and regulation to the "wholesale merchants." They would not have to increase them, unlike the branch ministries that manufacture products today: after all, they make the plans for the prices. The Goskomsen only approves them.

G. I. Mikerin, candidate of economic sciences, Institute of Economics and Prediction of Scientific and Technical Progress of the USSR Academy of Sciences (Moscow): We have already discussed the need to revise prices and the credit and finance system before changing over to wholesale trade. All this is correct, but only if we are speaking about those prices and interest rates for credit which provide for national economic balance. The latter

is provided in the prices of the final sales, from which all the macroeconomic indicators are determined. And on the basis of these indicators we calculate the national economic normatives of the effectiveness of capital investments, whose amount should serve as the basis for the amount of the interest rate. According to macroeconomic calculations, the amount of the normative during the past 15 years has been 0.1-0.12. But according to calculations in wholesale prices of enterprises for industry and for all of material production with the exception of trade, the normative of effectiveness of capital investments, beginning in the middle of the 1970's, has values close to zero. This means that the normative national economic effectiveness of capital investments is provided completely through increasing turnover tax and trade discounts that are included in retail prices. In other words, the payment for state credit for production is made not by the enterprises but by the population.

Under current conditions the majority of enterprises are not able to pay for credit at the national economic normative. And interest-free (or with a very low interest) allotment of financial resources inevitably leads to a situation where they are not covered by materials. Another result of practically free credit is the complete lack of desire on the part of the enterprises to intensify production and introduce the achievements of scientific and technical progress.

The introduction of interest rates that correspond to the conditions of reproduction according to the final sales prices, with the organization of wholesale trade at wholesale prices of the enterprises, can lead only to artificial bankruptcy of the majority of them, and primarily those that are in the technological chains of production of the final products that are in shortest supply. For these kinds of products have an especially great disparity between the final sales prices and the wholesale prices of the enterprises.

The utilization of wholesale prices of industry, that is, the inclusion of a turnover tax in them, made it possible (during the same period) to provide for payments in the amount of only 5-6 percent of the increase in production capital, or half of the national economic normative. But this level was retained until 1983 when, because of the revision of prices in industry and procurement prices in agriculture, for the first time there was a reduction in the national income created in industry—by 12 billion rubles. If at that time we had introduced wholesale trade in means of production, the consequences could have been terrible.

There is an interconnectedness among various economic levers, which are also associated with various departments. Increasing the effectiveness of public production can be achieved only by accounting for this interconnectedness and observing a particular sequence in the restructuring of the entire economic mechanism.



M. G. Zavel'skiy, doctor of economic sciences, Institute of Economic Problems of Comprehensive Development of the National Economy of Moscow: I, like everyone here, am in favor of changing material and technical supply and sales over to wholesale trade. But I think that we must consider several alternative integrated concepts. It would be best to discuss them first at scientific forums where we could also work out a final decision in the form of recommendations to directive agencies concerning the preference for one particular concept. Otherwise, everything will amount to something that has already happened repeatedly: from one concept we will form another one that has uncoordinated elements and, as a result, the reform will be unsuccessful.

At one time in the press there appeared an article about how in one scientific research institute of the textile industry 20 modern Japanese modern automatic looms disappeared. Then this equipment was discovered in a good modern production which, however, was not registered along with the other state enterprises. Will the same thing not happen in this case? It seems to me that there might a pumping of the population's funds to places that are not intended by the authors of the gradual changeover to trade in means of production. There is nothing especially bad in this because then this concept will eventually merge into the concept of V. M. Polterovich.

We have an economy with directed assignments and an economy of real competition (my name). The question is how to combine these two economies. How do we make it so that the economy with directed assignments does not impede the effect achieved by the second economy, but develops it and makes it possible to use it. I think that we will maintain ministries in some form, and this means that they should play a role not only as organizers of a unified technical policy in the branch but, being themselves under cost-accounting conditions and responsible for the output of products in the various profiles of the branch, they should pay fines for failure to fulfill the plan and, on the other hand, they should have the opportunity to fulfill the plan by enlisting the second economy. At the same time they should have the opportunity to obtain another effect from its existence—part of the income tax. Then our planning departmental agencies will be interested in utilizing the second economy and developing it.

A large shortcoming in the concept of V. D. Belkin and his co-authors is the tendency toward monopolization of production. It is well and good to announce that it is necessary to close down and eliminate poor enterprises. But this means living people, and it is not so simple to do this, so we have not succeeded so far. This means that we must look for some mechanism which would make it possible to bring the worst enterprises up to the level of the best: it is necessary to compensate these collectives for those expenditures they make that are not their fault but arise from the objective circumstances that exist

here, and they must be compensated in funds that they can use for purchasing new technical equipment and technology, and they must be competitive.

They have completely bypassed the question of the participation of enterprises in foreign trade operations. This, in my opinion, is a strong level for increasing the effectiveness of the operation of our enterprises and it cannot be separated from the question of changing over to wholesale trade.

M. S. Kunyavskiy, doctor of economic sciences, Belorussian State Institute of the National Economy (Minsk): I share the concept of V. D. Belkin in principle and with respect to the paths to the solution as well. I think that this process should be gradual and I can give sufficient arguments. The entire system of circulation cannot be turned over to fulfill trade; some portion of it will still be funded according to cards: this is necessary. But the main sphere will be filled with wholesale trade. We must begin with light industry, with consumer goods, as was correctly noted here. Viktor Danilovich has a clear awareness that we are not speaking about a partial issue, and not just one sphere of circulation, and it must be in unity with the changes in the sphere of production that the sphere of production will be improved—they cannot be separated.

Today we neglected one aspect that returns to the shortcomings in material and technical supply, the current system for which makes it possible for some people not only to live well, but even to thrive. The economic mechanism is a real system of social relations. When speaking about its improvement one must strike a blow to certain interests and, naturally, one can expect a counterblow. We are always encountering this. If we begin a real improvement of the sphere of circulation today, a real resistance will also begin. We encountered this when conducting the reform of light industry in Belorussia.

A. G. Zhuravlev, doctor of economic sciences, Belorussian SSR Ministry of Housing and Municipal Services (Minsk): In order to correctly answer the question of how to begin the reform, we must raise the question without which it cannot be developed or completed. The fact is that there has been no shortage of undertakings in recent years. I shall begin with this thesis: any economic reform is simultaneously a political reform. And this means that it will be necessary to actually intrude into the area of the economic mechanism, which is equivalent to the economic policy, or management relations. Consequently it will be necessary to intrude into an area which in all preceding undertakings was virgin territory—which is why, in my opinion, these undertakings were unsuccessful and did not justify our expectations.

Where should we begin? We have already discussed the fact that it is necessary to attentively study both domestic and foreign experience in the area of restructuring the economic mechanism. It is already too late to begin with



an experiment. Thus it is the duty of theory to generalize the experience of economic practice. I share the viewpoint that we need alternative variants through whose consideration we can make a long-term decision concerning the changeover of all public production to new management conditions.

As soon as we intrude into the area of management relations, the area of economic policy, the area of human interest, cannot bypass a reform of property relations. This has never been done, at least not during the past 20 years. As soon as we seriously begin wholesale trade in means of production, the question will immediately arise: whose property are the means of production acquired with the funds of labor collectives and not with borrowed money? It seems that for success of the reform, including in the area of material and technical supply, it is necessary in all ways to develop that very element of the system of property relations which is called collective property. Only through this can we provide for economic independence and motivation for the manager. This is where we should begin: with an analysis of property relations, as they have taken form and as they should develop. The reform is not an experiment but theoretically substantiated practical activity directed toward improving the entire complex of production relations and, consequently, property relations as well.

I. V. Nit, doctor of economic sciences, MGU: In his speech Viktor Danilovich drew attention to the problem of the transition period. V. M. Polterovich was absolutely right when he said that it is necessary to think about the mechanism for changing the economic mechanism. If we do not think about such a mechanism, the reform will be doomed to failure. In our opinion, the "mechanism of mechanisms" is inseparable from the reform and should be included in its very essence and be its pivotal point. Our proposals have such a mechanism. The idea is this: the reform begins with a one-time push, and then it continues as a result of natural development of consequences ensuing from it.

It seems to us that the development of the reform will proceed because of stimuli that are already in it from the very beginning and those which will be manifested in the process of its development. One of the strongest stimuli motivating social activity is the possibility of the individual to realize himself. A ruble received in wages, which almost does not depend on the final result, and a ruble earned among the population who have voluntarily expressed their recognition of the results of your labor—these are two different, essentially different, rubles. The honorably earned ruble will make it possible for a person to find himself and his social position.

But the question remains: where to begin? How can one compete for unreal money, for example, for "profit" which the collective cannot dispose of at its own discretion? It would be very difficult to count on the notion that under these conditions the managers of the higher rank could be the bearers of innovations. There are many

examples of this. Therefore, before changing over to competition it is necessary to create an interest in the results of the competition. This is what is envisioned in our proposals.

When discussing the ways of conducting the reform we considered many variants and came to the conclusion that we should begin with consumer goods. The fact is that if you establish wholesale trade and the residual principle for forming the wages for enterprises that produce certain other goods, you will thus create another extremely complicated problem—covering the effective demand with the mass of consumer goods.

Yu. P. Voronov, candidate of economic sciences, IEiOOP of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): I shall note an interesting idea that came through in several speeches: the future system of management must be discovered and not fabricated. This is almost a clear reproach to Viktor Danilovich, whose system is fabricated and has never existed in real life. It lacks the analytical retrospective view of those process which have taken place in our economy.

It is true that we say too much about the directiveness of an element of the existing planning practice. For example, the director received money to build a residential building. He invests it in the foundations for two buildings. This operation is a typical stockbroker play for more money. Then he comes and says: "I have two foundations, give me more money. Another situation. A new director, when he comes to the enterprise, as a rule, fails to fulfill the plan for that year. He does this deliberately. In fact this is a classic stockbroker transaction for a period of time which was prohibited on the Soviet market. Here it is as though the director is playing for a reduction.

The path proposed by Viktor Danilovich and his co-authors is permissible, but in fact we must eliminate the stock market activity from the sphere of directive planning. It would be expedient, in my opinion, to gradually form a market of value certificates so that an advanced enterprise can sell the right to use its trademark and then it would not seem to us that it is getting money for nothing. We must take the path of partial shareholding and general discussions of cooperative and state forms must be translated to the plane of practical recommendations. It is necessary, for example, to become accustomed to a situation where a person who has worked for a long time has the right to receive dividends for certificates of value which he has earned.

I would give this definition of wholesale trade: It is what stands behind the market of value certificates. It is necessary to sell not technical equipment, but the right to use it while simultaneously strictly guaranteeing the observance of these rights.

Finally, the personnel problem. Who will enter into wholesale trade in means of production? When the NEP began one of the questions was this: for 20 months the Soviet economy existed without a bank. Will we find personnel and—the main thing—the desire on the part of people to work with the bank system? After that we worked for 60 years without commercial credit, without a desire on the part of directors of enterprises to seek out sales and find demand. In exactly the same way scientific workers lost interest in the functioning of the commodity and monetary economy. We actually imagine a retail economy as a bazaar in which one jacket is exchanged for one ax. Such a market with respect to means of production has not existed for a long time and it never will exist again.

I. Z. Kaganovich, doctor of economic sciences, Institute of Economics of the Estonian SSR Academy of Sciences (Tallinn): Under current conditions there can be no wholesale trade. There are many variants of the reform and many objects of it. But, probably, we need precisely the variant that was proposed here. There are many reasons for this, and one of them is that there are people who want to and are able to conduct it. Whether the reform produces the desired result completely or not, something still remains in the positive. Of course, a large system always has the ability to assimilate all kinds of partial changes (this is happening, for example, with the Agroprom). The main thing that is left is the school. The only school there can be for training personnel when there are no students, teachers or "teachers of teachers" is life. And wholesale trade is a successful form of economic education.

S. V. Kugushev, USSR State Committee for Labor and Social Problems (Moscow): I am in favor of the idea of the coexistence of several economic mechanisms. It includes among the basic principles of the reform the insurance of coordinated functioning of individual forms of management within the framework of a single economic mechanism.

The coexistence of the subsystems of the economic mechanism should provide:

effective and dynamic exchange of scientific and technical achievements, organizational or economic innovations, and so forth;

flexibility in the distribution of resources and the possibility of strategic and tactical maneuvering of them;

equality of possibilities of all subsystems on the basis of complete accounting for differences in the degree of stability and economic risk.

Associations, enterprises, and organizations, regardless of their economic form, should have equal opportunities to satisfy the demand for resources, they should receive

income on the basis of the effectiveness of production they have achieved, and they should provide for a level and dynamics of wages that corresponds to the results that have been received.

The mechanism for coordination includes, in the first place, coordination of resources and, in the second place, coordination of incomes. Coordination of resources can envision planned determination of priorities and a three-channel system of distribution: centralized supply, provision through economic agreements (established under a planned policy), and wholesale trade.

Coordination of incomes can include for certain enterprises a unified tax on profit and a progressive (depending on the profitability norm) normative for the formation of the funds for the development of production, and for others—progressive taxes on profit and a normative for the formation of the insurance fund. Coordination in terms of the dynamics and level of wages can be carried out through planned distribution of the wage fund for the first group of enterprises and the nonproduction sphere, and normative formation of funds for wages. For the second group there should be progressive taxation on the increase of the fund or the average wage.

The interaction of the subsystems of the integrated economic mechanism can also be carried out through their combination within the framework of an individual enterprise or organization.

Of course the concrete mechanisms for interaction among various forms of management can be developed as the integrated economic mechanism is formed.

A. D. Chayko, candidate of economic sciences, Bashkir Agricultural Institute (UFA): The economic mechanism that exists in agriculture does not make it possible for the enterprises of the branch to provide for sufficiently complete satisfaction of the needs, even when money is available. This is related not only to the inadequate volume of funds that are allotted, but also to the lack of a legal possibility of obtaining resources in excess of the established limits. If up until recently the funded materials could still go to the agricultural enterprises through patronage assistance, now this channel is completely closed off.

In our opinion, within the framework of the RAPO we should create wholesale trade bases that have the right to conclude direct agreements with industrial and agricultural enterprises. The basic list of goods should include agricultural machinery, spare parts, construction materials, metals, fertilizers, chemicals, computer equipment, seed material, and so forth. Within the framework of wholesale trade, we should also organize the sale of surplus agricultural products and material and technical supplies of the farms on a commission basis.

Wholesale trade will make it possible to regulate the utilization of monetary funds. It will reduce the volumes of credit and considerably reduce expenditures on technical servicing and current and capital repair of technical equipment because of the reduction of the number of brands of machines, it will increase the turnover of circulating capital, and so forth. In order to regulate material and technical supply for agriculture, an Agrosnab should be created as part of the Gosagroprom.

V. V. Ivanter, candidate of economic sciences, Institute of Economics and Prediction of Scientific and Technical Progress of the USSR Academy of Sciences (Moscow): There is no doubt that today the changeover from the distribution of production resources to the trade in them, even though it requires the resolution of a number of organizational and technical problems, is possible in principle. But the effect—resource saving—can be achieved only with the changeover to nonshortage trade. How does one organize this with the available volume of material resources and money? The answer is simple. Under the conditions of a significant increase in the sum of circulating payment funds over the volume of circulating material resources of trade, it is impossible to do this. Does this mean that we must wait until the economic circulation normalizes? But without wholesale trade in means of production it will never normalize. What to do? (In general, let us note that economists have the ability to ask questions that significantly outpaces their ability to answer them). The solution from this "blind alley" is apparently possible in a stage-by-stage system of changing the economy over to wholesale trade.

Businessmen must be shown the attractiveness of wholesale trade. Up to this point they require not trade, but stable material and technical supply. Consequently, if we are able to make wholesale trade a synonym for stable supply of the enterprises with raw materials, processed materials, and equipment—then we will be successful. If we are not able to do this we will be conducting meetings and round tables and "tables" of all other shapes until the end of the millenium and beyond. Work in stages is impossible: departmental-branch, territorial, or functional. We can begin with the ministry or branch, republic or group of oblasts. But for enterprises of other branches, ministries, and regions this will be foreign experience. Naturally, there are misgivings, and not unjustified ones, that expansion of resources will not be enough.

Without ruling out this path either, it would be expedient to begin with material supply on the basis of wholesale trade only for funds for development and social and cultural and domestic purposes, but then it should affect enterprises of all departments, branches, and regions. The advantages of such an approach are obvious: the overall volume of monetary funds is limited (less than 10 million rubles), and, consequently, it is possible actually to equal this amount with resources; all businesses are participating and from their own experience they are convinced of the advantages of trade; the efficiency of

economic incentives for effective management increases: money earned by the enterprise is actually covered by materials. The technical difficulties in organizing wholesale trade to provide for these funds are minimal. The funds are kept in individual bank accounts; the measures conducted with them are planned ahead of time. The time periods can be determined fairly clearly.

V. N. Bogachev, doctor of economic sciences, Institute of Economics of the USSR Academy of Sciences: I wish to draw attention to one obvious, but for some reason sometimes forgotten peculiarity of our economy: it is a highly concentrated economy with more centralized administration. If its constituent economic units are oriented toward the classical commercial criteria of effectiveness—sales volume, profit, and so forth—this gives rise to monopolistic distortions. We are quite familiar with them. One asks: will the change in the conditions for circulation and the replacement of funding with trade not lead to a strengthening of the antisocial monopolistic effect?

Supply agencies are criticized for bureaucratization, inefficiency, and so forth. All this is true. But the Gosbank as an agency of state authority is still able to achieve, although perhaps not with complete success, a certain diversification of deliveries and changes in their nomenclature in the necessary direction. And what will happen with the "free market"? There will be high-grade rolled metal in only one profile: if you want it, take it, if you do not want it, do not take it. And where will you go if you do not take it? The consumers will hardly give you your own rolling mill or your own blast furnace. And so there will be tons of metal doomed to be processed into shavings. If the prevalence of the supplier in the market is determined by factors that lie outside the sphere of circulation, then funding has its merits and not only shortcomings.

It would be good, of course, if the "music were ordered" by the consumer, but under the conditions of the dictatorship of the producer, supply using cards has the advantage of stability. We know that for a food order you receive what is indicated on the list, and if you go into a store God only knows whether there will be raw material today or not.... Will there be stable and reliable supply through wholesale trade under the conditions of the absolute supremacy of the producer? We must first figure out the reasons for the imbalance. It will hardly be possible to correct it through reforms that pertain only to prices, credit, and finances.

L. F. Moiseyeva, candidate of economic sciences, Central Economic and Mathematics Institute of the USSR Academy of Sciences (Moscow): According to our research, about 90 percent of the monetary circulation of the enterprises in the production sphere is provided through the utilization of credit. The bank is the predominant economic institution in the formation of monetary flows of the economy, which is constantly mediating the current production activity of the enterprises. The

embodiment in the bank alone of accounting, emission, and credit functions makes it possible in certain cases to utilize the credit mechanism in spheres that do not correspond to the economic purpose of the bank. The state bank then becomes an intermediary in purely economic and production relations among enterprises.

Regardless of what kinds of products the enterprise produces—for production purposes or for popular consumption—whenever it sells them it has an intermediary which is not always sufficiently interested in high-quality commodities since this intermediary itself enlists easily available external credit sources to pay for them. Gosbank agencies pay for products mainly with credit investments of the bank. Retail trade also intensively utilizes the credit mechanism to pay for goods that are coming in.

Thus the bank, while taking on the functions of intermediary in economic relations between contracting agents in production, at the same time bears no real economic responsibility for the final consumption of the product and does not always contribute to economical expenditure of the monetary funds. Hence there are above-normative production stocks, stocks of prepared products in the warehouses, and unsold commodities in the retail trade network.

It seems to me that V. D. Belkin is not completely correct when he speaks about the initial unit from which it is possible to begin the development of wholesale trade in means of production. I think that it is precisely in the imbalance of the monetary circulation, incomes, and expenditures and in the formation of monetary circulation with excessive utilization of the credit mechanism that one can find the sources of violations of commodity and monetary proportions, which (the sources) then begin to be spread throughout all units of the economic mechanism. And this takes place now because the Gosbank does not see all the shortcomings produced, as it were, by extensive participation in the spheres of production and circulation and in the movement of the commodity that has been created. It like every other enterprise is operating within the framework of instructional prescriptions. These prescriptions allow some things and prohibit others. Bank workers demonstrate impressive competence in their knowledge of the financial condition of an enterprise that has been given credit and activity in limiting the issuance of credit to those economic agencies which, in their opinion, are not reliable clients. But nonetheless there are still many various methods, including bureaucratic ones, of obtaining borrowed money. In brief, we need a preliminary reform of the credit system.

One more aspect mentioned by V. D. Belkin is that the enterprises have extra money. In my opinion this is not altogether true. The enterprise has only a monetary demand which is formed, as was already noted, basically not through its own money, but through external financial sources. We have almost not considered questions of

the enterprise's real ability to pay and in fact it is precisely this that is the cornerstone of the formation of its economic behavior and the interests of improving cost accounting as a whole. To make it possible in the future for enterprises to form adequate monetary reserves means to touch upon all spheres of their functioning and improve the system of distribution of profit, interrelations with the finance and credit system, and other fundamental aspects of cost accounting. This is how many problems are involved in what would seem to be a "particular" problem of the development of wholesale trade in means of production.

S. S. Shatalin: They say the concept must be discovered rather than fabricated. Of course nothing can be done in an empty place. Marxism, as you know, arose out of three sources. Of course we must draw the sources of the reform from the real development of events. But if we limit ourselves only to this we will be standing still. We need a real organic compromise that takes into account existing limitations, social experience, and the level of personnel. But to rely solely on existing practice is in principle incorrect; it is a blind alley. We do not have unfettered thinking yet. And even today we were discussing things as though our current economic mechanism would last another thousand years.

If directive centralized planning remains in its current form, then wholesale trade is a toy. I too am in favor of many channels. In any economy there are various enclaves which exist according to completely different laws: the extraction industry, the infrastructure, the transportation systems, and so forth. With respect to each of these enclaves, different management mechanisms are applied everywhere.

It is sad that we know so little about the experience of the socialist countries, although we have been studying it for a long time, and we know even less about the real experience of the West in solving such problems. Many of us have begun to confuse a retail economy with a bazaar economy. And this did not exist even in Adam Smith's times.

Wholesale trade is not the bazaar principle: "I bought it, I have money, they sold it to me...." This is not the case and it need not be the case. We need really to maintain fund distribution, but in other forms, within the framework of the strategic directions and the creation of state reserves and reserves for large-scale operations on the market so as to maintain certain branches, that is, a mass of things exists, including wholesale trade, that cannot be included within the framework of the traditional market mechanisms. It would be criminal and stupid to unify everything. It is not possible to satisfy the problem of demand and balance through trade alone. I support those who think that first it is necessary to balance the consumer market. This could be a more powerful prerequisite for wholesale trade than that which we link directly

to it. So far there is no balance in the market and neither incentives or other factors work. Therefore wholesale trade cannot be a panacea in these decisions.

Further, of course, there is credit. There is no other economy in the world that would let free resources lie around doing nothing. If this channel is not closed off wholesale trade is again simply a toy. We have a mass of free resources to which not a single one of the strict economic mechanisms can be applied. There are labor, natural, and new capital investments, and old capital.... If all this remains, we will not improve anything with wholesale trade. We are speaking not simply about the economic mechanism, but about a radical reform of socialist property and the socioeconomic system. After this will come the matter of wholesale trade.

Where to begin? With everything at the same time, but observing the principle of gradual progress. By the end of the 12th Five-Year Plan we undoubtedly must have a principally new economic mechanism. But now we must think about the transitional processes, including moving gradually. But this is gradual in a different way, it is not the same as initially reforming retail prices, then reforming wholesale prices, then issuing a decree about wholesale trade, then about housing construction, then about capital construction, then about the development of ferrous metallurgy.... We must know precisely where we want to end up.

V. D. Belkin: Here people ask who will conduct the reform. We need not commissions but a government agency like the State Economic Council which was preparing for the 1965 Reform but, unfortunately, was closed down before it had finished.

Balance on the market of consumer goods as a prerequisite for changing over to wholesale trade, which Stanislav Sergeyevich discussed, is a nice hope. But it is quite unrealistic. What we are suggesting also works in exactly the same direction, but there are no means of achieving balance immediately. It was stated that since in the national economy there is much "easy money" we should first conduct a finance and credit reform. As we have said: It is precisely because there is "easy" money that we cannot introduce wholesale trade everywhere, and we suggest that at first the process take place essentially using the consumer's money. To do this it is necessary to begin with a group of enterprises that produce goods for the population.

It was stated that combined forms would be desirable, but not a general changeover to wholesale trade. I favor this. There should be diversity in the economy: the prevalence of wholesale trade does not rule out the possibility, where necessary, of retaining funded material and technical supply.

M. G. Zavel'skiy warned against possible uncontrolled flow of resources in the direction of enterprises that have entered on the path of the reform. In order to avoid the

temptation of filling the orders from these enterprises at the expense of other consumers, it is necessary to permit the utilization of money from special accounts only after the fulfillment of all planned deliveries, say, for the quarter or the year.

Before changing over to wholesale trade it will be necessary to arrange for competition. But who will be competing for "easy" money? It can be obtained from the bank. They say that this should be done before conducting the reform, but I am in favor of doing it all together. Here is the difference. There can be competition only for real money, which the collective can use at its own discretion.

The alternative solution is large associations with maximum self-supporting production. Such vertical combines exist in the GDR. Their creation was made necessary partially by balance. But under the conditions of imbalance, it is known where it is advantageous to engage in diversification, where to have specialization, and where to have combines like these. For we cannot eliminate this diversification simply because we cannot obtain similar products under a policy of material supply from other enterprises. It is necessary to have various possibilities and select the one that is effective from a national economic position. This is certainly not an alternative to our proposals. We are in favor of it.

The need for accounting for foreign trade operations has also been discussed. Absolutely correct. The world market can play the same role in our constructs as the market for consumer goods. Enterprises that produce products for export should also change over to material and technical supply through wholesale trade. In addition to the currency that can be earned from exports it is also necessary to take into account the currency saved as a result of imports. It is necessary to encourage enterprises that produce items which can replace imported ones. Thus they will make it possible to save currency for the state.

Much that is critical has been said about the bank. If one is to speak of the bank as it is now, of course, this is correct. But we must think about the bank as it will after the change. The bank is a cost-accounting agency and an equal partner of the enterprises which is independent of the state in its financial operations. The bank should exist on the money made by the difference between interest received and interest paid, that is, it should not produce easy money and fill the channels of circulation with it. Not all of this can be done under today's conditions. Therefore we are speaking about a simultaneous reform of the credit and finance system, wholesale trade, and price setting.

And, finally, no matter how quickly we can carry out the reform, will it not die out because of delay? The principle of gradual implementation that we suggest does not mean prolongation. In our opinion, the reform can be completed in one five-year plan.

In conclusion let me say that the discussion has been useful and we shall think about and study everything that has been said. This inspires us to work further in this direction.

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### Energy System Development Discussed

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[Discussion by I. A. Nikulin, professor, honored energy expert of the RSFSR (Moscow): "The Strategy in the Area of Energy Systems"]

[Text] The growth of energy consumption brought about by scientific and technical progress inevitably leads to an increased proportion of electric energy in the overall sum of energy resources expended in the country. In order to reach the high world level of labor productivity, energy consumption per one person working in industry must be more than doubled (in 1984 the annual electricity consumption per one worker in USSR industry amounted to 29,400 kilowatt hours while, for example, in the United States it was 62,400 kilowatt hours). But increasing electricity consumption does not contradict the global direction toward the creation of energy-saving technologies and the reduction of the energy-intensiveness of the national income. Only 24-25 percent of the boiler and furnace fuel used in the country goes for the production of electric energy now. Therefore the main reserves for economizing on fuel and energy resources lie outside electric energy engineering: they consist in more complete utilization of secondary energy resources and exothermic processes, streamlining of the shipment of cargoes on all kinds of transportation, reduction of energy losses as a result of increased heat insulation of the wall elements, buildings, structures, and industrial and domestic units (pyrotechnical, thermal and refrigeration), communications, and so forth, and also increasing the efficiency factor of the direct utilization of the heat-producing capability of fuel and elimination of losses during transportation and storage. A most important area for reducing the overall energy-intensiveness of the national income is improvement of the quality and increased reliability and durability of products.

### Electric Energy Cannot Be Put in a Warehouse

The growth of electric energy production should coincide with its consumption, and they should coincide precisely in time. For electric energy cannot be placed in a warehouse, and it cannot be taken from a warehouse—it can be produced only at the moment of consumption. In the "warehouse" for providing for continuous and

high-quality electric energy supply there must constantly be the minimum necessary rotating "hot" reserve of capacities of generators and electric power stations and the corresponding supplies of energy bearers, and this should be in keeping with precise and uncompromising laws of electric energy technology. In the Unified Energy System (UES) of the USSR, which extends from the Transbaykal area to the Western border of the USSR, mobile reserves should be available in each unit and for each regional energy system. How can they be created?

### A Balance of Capacities Is Needed

The average annual rates of increase in electric energy consumption in the USSR under the 11th Five-Year Plan amounted to 3.8 percent. These were basically caused by extensive factors in the development of production. Under the 10th and essentially under the 11th Five-Year Plan, because of the great difficulties in providing the national economy with electric energy there was a strict limitation of its consumption and a compulsory reduction of the consumed capacity through reducing the frequency of the electric current in the UES. The requirements of the standard were not maintained for the voltage in the electric power networks for the consumers either. Periodically there were emergency failures for individual consumers. All this led to losses in output, inefficient expenditures and losses of labor, material and fuel-energy resources, and it held back the growth of labor productivity.

The very fact of compulsory limitation with respect to the level reached contradicts the development of processes of mechanization and automation and the implementation of principally new technological decisions that provide for a real reduction of total expenditures of energy resources. This was convincingly discussed by Academician K. Bemirchan within an interview with a correspondent from LITERATURNAYA GAZETA (26 March 1986). But limitation, like additional restrictions, was necessary because we had not provided for the necessary development of electric energy in our country.

In order to overcome the existing difficulties and create conditions for the necessary increase in energy consumption caused by technical progress, it will be necessary to objectively analyze and eliminate the causes of these difficulties. "A responsible analysis of the past clears the way to the future, but a half-truth, cautiously circumventing the sharp points, slows down the development of a real policy and impedes our forward movement," said General Secretary of the CPSU Central Committee Comrade M. S. Gorbachev in the political report to the 27th Party Congress.

Let us consider the processes that have taken place in the development of energy systems of the USSR Ministry of Power and Electrification. Under the 10th and 11th Five-Year Plans from year to year the ministry failed to assimilate the allotted capital investments and did not

fulfill the assignments for starting up capacities at electric power stations, which led to a reduction under the 11th Five-Year Plan of the proportion of capital investments in electric energy to 8.2 percent of the overall capital investments in industry as compared to 10.1 percent under the 9th Five-Year Plan and 11.1 percent under the 8th. Under the 11th Five-Year Plan the average annual startup of capacities at electric power stations was almost 1 million kilowatts less than under the 8th and 9th five-year plans.

Let us also note the peculiarities of the distribution of electric power stations relative to the existing and developing centers of electric energy consumption. Under the 8th and 9th five-year plans a large number of thermal electric power stations were constructed with energy blocks of small and medium capacities (50-300 megawatts) that were concentrated in the centers of electricity consumption. Under the 10th and 11th five-year plans their number decreased sharply but the energy blocks were enlarged to 50-1000 megawatts with a corresponding move to greater distances from the consumers. The monopolistic situation of the Ministry of Power and Electrification in determining the technical policy of electric energy engineering and the excessive labor-intensiveness of the assimilation of capital investments allotted for this branch led to a situation where the selection of the type of new electric power stations, their distribution, and the sequence for their construction was subordinated mainly to flowline processes of planning, the creation of bases for the construction industry, and the organization of construction itself without properly accounting for the real possibilities of effective utilization of the capacities that were put into operation.

In Siberia during the 1960s the largest hydroelectric power stations in the world were constructed one after another, and the construction of new condensation thermal electric power stations that use the untold supplies of inexpensive local coals, which was previously done on a broad front, was curtailed. For example, in the Kuzbass, which is literally standing on effective energy coal, the installed capacities of thermoelectric power stations (TES) have remained unchanged for 17 years, since 1969. This led to the formation in Siberia of an inefficiently large proportion of GES's [hydroelectric power stations] (56 percent of the capacity and 37-50 percent of the electric energy that is produced) and made the electric power supplies of the national economy strongly dependent on the amount of water in the rivers that changes in various years and at various times of the year, that is, on random elements.

The startup in 1963 of the capacities of the Bratskaya GES when there were no local consumers of energy caused a great removal of the load and a decline of the economic effectiveness of the operation of all thermal electric power stations in Siberia. The energy of the Bratskaya GES was transferred over thousands of kilometers through electric power transmission lines, taking away the load from the TES's. The startup in 1967 of the

Krasnoyarskaya GES exacerbated the process of removing the load from the TES's, and in the Kuzbass the number of hours and the coefficient of the utilization of the installed capacity by 1970 had dropped to 4,393 (50 percent) as against 7,339 (86 percent) in 1963, which led to a reduction of the demand for coal for the TES's and a disorientation of the Siberian coal industry.

After 1970, when the increases in the electric energy consumption along with the exhaustion of the capacities of the GES's caused a rapid growth of the production of electric energy at TES's and a growth of coal consumption, difficulties arose with fuel. Since 1974 the TES's of Siberia have been working extremely intensively in dry years. Except for the Berezhovskaya GRES [State Regional Electric Power Station] of KATEK [Kansk-Achinsk Fuel-Energy Complex], there are no significant reserves for thermal electric power stations using local coal in Siberia.

In 1982 at the end of the dry period the output of electric energy at Siberian GES's dropped below the guaranteed minimum and the inadequate capacities of TES's made it impossible to compensate for this reduction. Large restrictions were placed on consumers of electric energy, right down to halting the series of electrolyzers at the aluminum plants. A considerable amount of harm was caused to the economy. In 1985 with all the rain the output of the GES increased by a factor of 1.5 as compared to the 1982 level. Moreover, because of the seasonal fluctuations, we did not manage to use 14 billion kilowatt hours of hydroelectric energy: it was simply thrown away. The periodic shortage of hydroelectric energy must be compensated for through thermal electric power stations. Therefore fluctuations inevitably appear in the demand for coal. The high proportion of GES's and the shortage of the base capacities of the TES's also lead to a sharp lack of correspondence between the structure and the energy characteristics of Siberian electric power stations as well as to heavy schedules for loading them.

The failure to fulfill the past five-year plans for more rapid development of energy engineering in the eastern regions of the country, where 87 percent of the potential energy resources are concentrated, mainly large GRES's using inexpensive coal from the Kansk-Achinsk and Ekibastuz basins, caused a shortage of electric energy in the base capacity of energy facilities in Siberia, Kazakhstan, and especially the Urals, where they are oriented toward obtaining electric energy from the Ekibastuz GRES's.

At the same time as the aforementioned negative processes were taking place in energy engineering in Siberia, in the northwestern European part of the country, according to the laws of the same construction conveyor, there was flowline construction of large GRES's using fuel oil: during 1969-1971 alone large capacities were introduced at the Kirishskaya, Lukomlskaya, Estonskaya and Litovskaya GRES's. In only 3 years at these four



electric power stations they introduced 3,700 megawatts, and at all the electric power stations of the northwest (in the four western republics and the eight energy systems of the RSFSR of Glavzapenergo) they introduced capacities for 4,898 megawatts. The fact that the introduction of capacities at TES's on the northwest outstripped the consumption led to a reduction of their overall loading even by 1972. But in 1973 they began again to introduce capacities at the Leningradskaya and Kolskaya AES's [nuclear power stations].

The number of hours and the coefficient of utilization of installed capacities in energy systems in the RSFSR of Glavsevpapenergo had decreased by 1975 to 4,165 (47.5 percent) as against 5,587 (63.8 percent) in 1969. Correspondingly, there was a 25.4 percent reduction of sales, profit and output-capital ratio for this main board. The output-capital ratio here was less than the average for the Ministry of Power and Electrification by a factor of 1.5.

The construction and more rapid startup of large thermal electric power stations in this region using fuel oil transported from the East and then atomic electric power stations (AES) provided for growing surpluses of capacities of electric power stations since 1970, which while fully covering the need for electric energy in their own zone formed a large flow of electric energy to the East—in the opposite direction of the transportation of the fuel. During the years of the 11th Five-Year Plan alone the flow of electric energy from the combined energy system of the Northwest to the Center amounted to 70 billion kilowatt-hours, which is equivalent to transporting 23 million conventional tons of fuel in opposite directions. The flows back and forth to the Urals amounted to 57 billion kilowatt hours (90 million conventional tons of fuel), to Kazakhstan—33.5 billion kilowatt hours (11 million conventional tons of fuel) and to Siberia—18.7 billion kilowatt hours (6 million tons of conventional fuel). Inefficient expenditures on transporting energy resources back and forth in this flow exceed 200 million rubles, and fuel expenditures to cover the loss of electric energy in the electric power transmission lines and the transportation of fuel in the opposite direction—1.3 million conventional tons of fuel.

The transfer of electric energy from the Northwest and other European countries of the country to the East cannot be economically justified because in all the European energy systems the production cost of electric energy exceeds that in Siberia by a factor of 2.1-2.7.

The two-decade delay in bringing Siberian and Kazakh coals into national economic circulation led to a decline in the proportion of coal in the fuel balance of thermal electric power stations of the USSR to 33 percent in 1984 as against 48 percent in 1970. Correspondingly, the expenditure of fuel oil, in spite of directives for reducing it, stayed at a high level in 1984 of 140 million tons of conventional fuel or 28 percent in the fuel balance of electric power stations as against 65.5 million conventional tons of fuel (24 percent) in 1970. At the same time,

for example, in the United States the expenditure of petroleum fuel at electric power stations which in 1970 amounted to 91.4 million conventional tons of fuel (12 percent) by 1984 had decreased to 44.7 million conventional tons of fuel (5.6 percent) and comprises an amount that is one-third of the absolute value and one-fifth of the value in the structure of the fuel balance of electric power stations in the USSR. The expenditure of coal in the United States by 1984 had increased to 609 million conventional tons of fuel (75.7) as against 291 million conventional tons of fuel (56 percent) in 1970. The proportion of TES's in the total production of electric energy in the USSR and the United States are now approximately the same—about 75 percent.

Supplies of coal in the USSR exceed those in the United States. There are enough of them for 300-400 years. There is no economic justification for leaving the coal in the ground and burning fuel oil and gas.

It seems quite necessary to make up for lost time and force the construction of thermal electric power stations using inexpensive local coals in the centers of developing electricity loads of Siberia and Kazakhstan, and also the construction of highly maneuverable electric power stations in the European part of the USSR, as has long been practiced in other countries of the world.

If in Siberia there is a critical shortage of the base capacities of TES's, in the European energy systems, conversely, they have constructed only base, nonmaneuverable electric power stations—gas and fuel oil GRES's with ultracritical parameters of steam and AES's. The plans for the 10th and 11th five-year plans for creating highly maneuverable energy blocks at TES's, the construction of pumped storage electric power stations (GAES), steam and gas (PGU) and gas turbine installations (GTU) in the European regions of the country were never fulfilled.

Lack of maneuverable and peak electric power stations and the surplus capacity of base stations led to difficulties in handling the night gaps in the schedule for loading the European energy systems. Let us emphasize that difficulties arose not in covering the maximum loads but during a period of minimal loads, because of the impossibility of unloading to the necessary degrees the gas and fuel oil GRES's with ultracritical parameters of steam and AES's. In spite of all these difficulties, when referring to the energy program, the Ministry of Power and Electrification at the present time in the European regions is forcing the construction of TES's and AES's. Even the best program envisions reasonable fulfillment of it. Why introduce capacities which cannot be included in the schedule for loading of the energy systems?

The highly maneuverable energy blocks and the special peak electric stations that are intended for covering short—morning and evening maximum loads—create conditions for the operation of the rest of the electric power stations with constant and optimal loading with



the highest technical and economic indicators. In economically developed countries special peak and maneuverable capacities exceed 20 percent of the total capacities of electric power stations. We need to think about this kind of construction as well.

### **In the Construction of Power Transmission Lines—Chronic Arrears**

The construction of electric power transmission lines (LEP) is chronically lagging behind the needs, as are the distribution networks for bringing the power to the consumers and ensuring reliability of the electric power service for the national economy. Many LEP's are working at the limit of their handling capacities, with loads that exceed the economical density of the current. The losses of electric energy in electricity networks of the USSR exceed losses in networks of other developed countries of the world by 2-4 percent, which is equivalent to an additional annual overexpenditure of fuel in an amount of 10-20 million conventional tons. Each year about 30 percent of the installed capacities of electric power stations of the UES as compared to the actual maximum load (December) do not participate in the coverage, including because of the necessary electric power station transmission lines.

Quite directly related to the disproportions in the development of energy systems, in addition to the orientation toward gigantic concentration of energy capacities, are also ultra-long distance and ultra-powerful electric power transmissions.

The problem of transporting large electric capacities over ultra-long distance and ultra-powerful lines has been under discussion since the end of the 1950's up to this very day. The basis for the beginning of these discussions in those years with a sharp lack of correspondence in our country between the distribution of energy resources and the productive forces, which have now been eliminated by AES's.

The first real development of this problem was the plan for an electric power transmission line with a direct current of 1,500 kilovolts from Ekibastuz to Tambov over a distance of 2,414 kilometers in order to transport inexpensive electric energy produced by the Ekibastuz GRES's to Tambov and beyond and, through direct current networks, to the West to consumers in the European regions of the country. This LPT was an element of the Ekibastuz fuel and energy complex which by 1990 was to have consisted of coal mines with an extraction of 170 million tons a year and four thermal electric power stations with the capacity of 4 million kilowatts each in the region of Ekibastuz. The capacities of these GRES's—16 million kilowatts—was intended mainly to cover the loads of Kazakhstan and transfer currents with large capacities to Central Asia, the Urals and Western Siberia along electric power transmission lines with alternating current of 500 and 1,150 kilovolts. Then the USSR Ministry of Power and Electrification in

1976 approved a plan for a direct current line of 1,500 kilovolts from Ekibastuz to Tambov, and construction began on it in 1978. In 8 years they have assimilated only 27 million rubles—about 6 percent of the volume of construction and installation work. There are no possibilities of utilizing this line for its planned purpose in the foreseeable future.

In the European regions of the USSR there are increasing surpluses of electric energy, including that which is artificially created. In Ekibastuz they have introduced only one GRES and with the actual rates of construction the next ones will be able to provide only for the needs of Kazakhstan itself. Possible surplus capacities of Ekibastuz GRES's under the condition of increasing rates of their construction will be fully realized in Central Asia, Western Siberia and the Urals where there is no reserve for constructing new thermal electric power stations.

Keeping these sad facts in mind, the USSR Gosstroy in December 1985 made a completely justified proposal to curtail under the 12th Five-Year Plan the long-term construction project of "Ekibastuz-Tambov," and to take the billion rubles' worth of capital investments, 160,000 tons of metal structures, 440,000 cubic meters of reinforced concrete and 103,000 tons of limes necessary for it and use them for the urgent needs of the national economy. First and foremost, this money and these resources are needed by the USSR Ministry of Power and Electrification itself for the construction of electric power transmission lines and substations that have been waiting for years and decades which are necessary in order to provide for maneuverability of the capacities of the OES [Consolidated Regional Power System].

For this undoubtedly correct proposal on the part of the USSR Gosstroy evoked hasty actions and feverish activity on the part of developers of new unique equipment for inventory and transformer substations of the LPT-1500 in the Ministry of the Electrical Equipment Industry. This is understandable. These represent the losing side in the growing disproportions and unsubstantiated orders in electric energy production. But one cannot understand the official position of the USSR Ministry of Power and Electrification and certain other researchers working in the areas related to the science of electric systems. In the controversy that has flared up concerning ultra-long distance electric power transmissions (December 1985-March 1986) the USSR Ministry of Power and Electrification and developers of the Ministry of the Electrical Equipment Industry literally on the move thought up a principally new, unplanned purpose for direct current electric power transmission from Ekibastuz to Tambov: to use it is one of the elements of the ultra-long distance integrated electrical ties between the GES's of Eastern Siberia and the AES's of the European part of the USSR; to transfer night surpluses of capacities of AES's up to 6 million kilowatts to Siberia and thus reduce the load of this GES with subsequent return of the

current from the capacities in Siberia in order for Siberian GES's to participate in covering the daily maximum loads of the European energy systems.

The necessary planning development was not done for this new proposal: it is not clear what the additional losses of capacity and electric energy would be from these daily reserve flows through direct current electric power transmission that works from Tambov to the AES, for example, to the Ignalinskaya or Smolenskaya, and also from Ekibastuz to the Siberian GES's, for example, to the Bratskaya, which has unutilized peak capacity. Neither the existing nor the planned system power transmission lines of 330, 500, 750, and 1,150 kilovolts were intended for this ultra-long distance transit of capacities of up to 6 million kilowatts. Specialists think that in order to do this a power transmission line of 1500 kilovolts would have to be extended from Ekibastuz to Eastern Siberia and possibly also from Tambov to the AES's of the Northwest and the South. Moreover, expenditures on the transfer of direct current would more than double and exceed 2 billion rubles. These funds must be used for the construction of maneuverable electric power stations which are in short supply in the European part of the country and base TES's—in Siberia.

### The Solution to the Problem Lies Elsewhere

It seems to us that it is necessary to construct all the system-forming and intersystem electric power transmission lines with alternating current of 300, 500, 750 and 1,150 kilovolts that are envisioned by the plan, which, even without the LPT-1500 kilovolts, will provide for the utilization of the real intersystem positive effect from the lack of correspondence between the maximum loads of the systems in time and other factors.

Only after exhausting the possibilities of the alternating current networks, with which the transfer of electric power costs half as much as it does with direct current, at some time in the future, possibly, it will be necessary to construct a large mainline with direct current with reverse capacities in all the unified electric power systems in the transit of "North-West-Eastern Siberia." In order to solve this large and very costly problem it will be necessary to make a new plan—in a calm situation weigh all of its positive and negative aspects as compared to the alternative variants for the development of the UES. For we are speaking about very large expenditures of many billions of rubles.

The debate concerning the billions for the Ekibastuz-Tambov LPT is not at all a debate about the international prestige of our science and technology in this area but a debate about the prestige of individuals who were involved in allowing the disproportions in the development of the unified energy system of the USSR.

The orientation toward the gigantic concentration of electric capacities and the "diversion" of large currents of electric energy through "ultra-long distance" and

"ultra-powerful" electric power transmission lines over territory that covers one-sixth of the earth's surface touched upon the fundamental scientific principles of the formation of electricity systems and electricity supply. It contradicts the theory and world experience in the formation of self-balancing energy systems, bringing electric power systems as close as possible to the centers of electricity consumption, and it also works against providing for technical and economic correspondence between the structure and the energy characteristics of the entire ensemble of electric power stations included in each OES as well as the nature and schedules of electricity consumption.

Electric energy engineering is one of the most capital-intensive branches of the national economy. The basic industrial capital of electric energy engineering as of 1 January 1985 amounted to 98 billion rubles or 12.2 percent of the entire sum in the country (among 33 ministries), and of this amount, of which electric power stations accounted for 52.6 billion rubles (54 percent) and electricity networks—33.7 billion rubles (34.4 percent). Expenditures on the passive part of capital—electricity networks—comprise 64 percent of the expenditures on the active part—electric power stations. In other developed countries of the world where there are no "ultra-long distance" or "ultra-powerful" electric power transmissions, and losses of electric energy and the energy networks are 2-4 percent less than here, expenditures on electricity networks are nonetheless equal to the expenditures on the electric power stations.

It seems quite necessary, having taken as a basis the principles recognized throughout world science and practice for the formation of electric energy systems, to revise the plans for the startup of capacities under the 12th Five-Year Plan. It is necessary to accelerate the construction of distribution system-forming and intersystem high voltage communications within each energy system and the OES in order to provide for complete utilization of the installed capacities of all the existing and newly introduced electric power stations and free maneuvering of these capacities while bringing them to the consumers of electric energy. Here it is very important to stipulate the fulfillment of coefficients and the number of hours of the utilization of unloaded thermal electric power stations, mainly those that operate on coal dust, to the average level for the USSR Ministry of Power and Electrification.

### A Couple of Suggestions and Conclusions

The number of hours of utilization of installed capacities of TES's determines the final indicators of the economic effectiveness of the energy systems: output-capital ratio and production cost of electric energy. The TES's in the foreseeable future will remain the main sources of electric energy, especially those that operate on coal dust, whose construction has been unjustifiably curtailed everywhere except in Ekibastuz and KATEK.

It is time to consider the question of changing the number of gas and fuel oil electric power stations over to coal, at the same time envisioning the development of the coal industry and above all the Kuznetsk Coal Basin. All the electric power stations that at one time were changed from coal to fuel oil, for example, the consolidated Berezhovskaya GRES in Belorussia, should be changed over to coal.

The work for rational development of the capacities of electric power stations should be combined with scientifically substantiated formation of energy systems which should be based on an immutable principle: obtaining the necessary production effect with a minimum of capital and operational expenditures.

Scientific and statistical methods make it possible with great reliability to do long-term and short-term prognostication of electric power consumption for each combined energy system in the country's unified energy system. The task of electric power engineers consist in attentively monitoring and improving these prognoses, providing for prompt startup of capacities and the development of electricity networks for reliable coverage of the constantly growing electricity loads in each region individually.

During past years the formation of the USSR UES was a goal in itself, while this process is only a means to an end. It was nothing other than this incorrect approach that could explain the large disproportions in the development of the USSR UES. Because of the fact that the formation of the consolidated power systems (OES) and the USSR UES as a whole was regarded as a prerequisite for a universal solution to the problems of providing the country with electric energy in separation from the real dynamics of the growth of electricity loads, the distribution and construction of electric power stations were subordinated to the interests of the construction flow and the fulfillment of the annual plan in terms of the total startup of capacities. Let us say that this capacity exists somewhere, that it is not included in the actual schedule of loading of energy systems, and that unutilized capacity is being accumulated. Then we "divert" it over "ultra-long distance" and "ultra-powerful" electric power transmission lines to places where there is not enough of it!

One can show where this concept led from the examples of Siberia and the Northwest. In Siberia at the end of the 1950's beginning with the Bratskaya GES, they organized a flowline for the construction of ultra-powerful GES's. The well-arranged construction flow for constructing a large number of thermal electric power stations that were located in the centers of electric power consumption using Siberian coal was violated. The Novosibirsk trusts Sibenergostroy and Sibenergomon-tazh, the largest in the country, which at the beginning of

the 1960's accumulated enough power to cover all the increase of electricity loads of all of Siberia, was left without orders sufficient to make use of these capacities and was degraded.

We must not subordinate the development of electric energy systems to the interests of the construction flow line and regard the formation of the UES as a goal in itself, as a prerequisite. The opposite is necessary: uncompromising subordination of the construction of the conveyor to the efficient construction of energy systems.

There can be no contradiction between the interests of construction and efficient construction of energy systems with scientific prognostication of the growth of electric power consumption in each individual subsystem and the UES. The optimal distribution of possible construction of TES's, GES's, GAES's, GTU's, TGU's and AES's for any time in the future, taking all factors into account, can be determined for the entire territory of the country. And further, while being oriented toward the existing and developing regional centers of electric power consumption, it remains for each of them to select the sequence of the construction of electric power stations and the optimal capacities and specifications while observing the principal of minimization of total capital and operational expenditures and above all on electricity networks and the transportation of fuel taken together. Planners of energy systems have always to one degree or another adhered to this principle. In general no "discoveries" are being made here.

But the long-range plans for the development of energy systems which previously (20 years ago) were developed conscientiously by the Teploelektroproyekt Institute and then the newly created Energosetproyekt were not fulfilled, and then the arbitrary decisions of the construction leadership began to be included in these long-range plans for development themselves.

The restoration of economically substantiated plans for the development of energy systems and their strict observance will provide for the necessary reformation of construction organizations and their attainment of a construction capacity which in each region will correspond to the needs for increasing energy capacities.

The fact that on the agenda today are only three basic facilities of "large-scale" energy engineering—Ekibastuz, KATEK and the series of AES's in the European part of the USSR—is undoubtedly the greatest negative result of the orientation toward ultra-long distance and ultra-powerful electric power transmission, which must be rejected immediately and forever. Everything that is ultra-powerful and extremely enlarged is essentially wrong! All reasonable engineering solutions must be only optimal.

The science of electricity systems is an extremely large and completely independent section of electrical technology which is recognized throughout the world. In our country each year dozens of special faculties graduate hundreds of engineers and technicians in the specialty "electrical systems." Electrical systems are the skeleton, the circulatory and the nervous system of the entire organism of the USSR UES. Ignoring the physical and economic essence of energy engineering and electrification for many years in practice could not but exert its influence on the ideology in these issues as well. The absorption of electric energy engineering and electrification by the global fuel and energy complex weakens the independent significance of the problem of electrification and cannot have a positive influence on technical, economic, and social progress.

The systems of petroleum lines, gas lines, and extraction and transportation of solid fuel that have been widely developed have more principal differences from the electric energy system than things in common. But in the Soviet Encyclopedic Dictionary (1983 edition, p 1545) all this is lumped under one heading—"Energy System." Other definitions—p 1540—"Electric Energy System" and p 425—"Unified Electric Energy System"—do not reflect that specific engineering features either. The encyclopedic dictionary does not include the classical definition—"Electric System."

With respect to the fuel complex electric energy systems are the same kinds of consumers of fuel as metallurgy, chemistry, and so forth (it has already been pointed out that 24 percent of the boiler fuel consumed in the country is used for the production of electric energy). At the same time the fuel complex (fuel branches of industry) is a large consumer of electric energy, as all other branches of the national economy are. Local energy resources are interchangeable while electricity, being the motive force of technical, economic, and social progress, is irreplaceable in the foreseeable future!

Electrification in its global independent significance no longer figures in program documents. And in the Academy of Sciences there is no institute or researchers with the qualifications of electrical technicians in the area of electrical systems. The right to decide the destiny of electrical systems—the most capital-intensive branch of industry—has been taken over without any justification by engineers and scientists in the area of power and heat generation, heating technology, heating equipment and atomic engineers who call themselves by the general name of energy engineers. This incorrect situation does not exist in a single other highly developed country in the world.

Electric energy engineers and electrification in the classical meaning of these terms are a ubiquitous and quite independent branch of the national economy. Lenin's formula concerning electrification will never be outdated. On the contrary, scientific and technical progress

continuously and repeatedly strengthens the significance of energy engineering and electrification, and there is no justification for diminishing them.

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### Merits of Alternative Fuels Examined

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[Article by Ye. B. Tsyarkin, candidate of technical sciences, Lennftekhin NPO (Leningrad): "Alternative Fuels: True and False Goals"]

[Text] ...After many years of practice I have become convinced that if any kind of absurdity becomes routine, the more absurd the absurdity, the more difficult it is to eradicate it—"Academician A. N. Krylov

### Energy Bearers and Fuel—Two Aspects of the Problem

The problem of the production of alternative fuels exceeded the boundaries of special publications a long time ago. It is now being discussed not only in scientific-popular, but also in sociopolitical magazines and newspapers and even in artistic literature. An example is the novel by A. Haley, "Overload," which was published in EKO, where unfeasible variants of energy supply in California are discussed in the most serious way.

The problem has received such broad public response for the simple reason that it has two clearly expressed aspects—scientific-technical and sociopolitical. As frequently happens in such cases, there is a certain distortion of ideas, erroneous interpretations automatically appear (as a result of half-truths), and sometimes there is simply speculation in critical aspects. Unfortunately, the problem of the so-called alternative fuels has not managed to avoid such a destiny.

As we know, the first energy crisis in the world broke out in England in the 16th century when the forests had been cut down and they had not yet learned to mine coal. At this time wood was traditional and coal was an alternative fuel. Then coal became the energy basis of the Industrial Revolution and prevailed as the traditional fuel for more than two centuries. Let us recall how the billionaire Rawlings sang the praises of "King Coal" in the "Hyperboloid of Engineer Garin." And yet even at that time it was clear to competent and far-sighted scientists that very soon petroleum would be an alternative to coal. Here is what was written, for example, by the authors of the GOELRO Plan in 1920: "The struggle for petroleum is beginning to crowd out the struggle for coal,

and certain economists think, not without justification, that our transitional age (the eve of the electricity century) is an age of petroleum." (Footnote 1) As we now clearly understand, this prediction came true completely.

The transformation of petroleum into Energy Bearer No 1 was held up by World War II since petroleum was not available everywhere. But after it ended, in all the developed countries of the world coal began to be replaced by petroleum, and then by petroleum and gas. In 10-15 years the structure of the energy balance underwent radical changes. From a ratio of coal to petroleum and gas of 70-30, in the majority of countries it changed to a ratio of 30-70!

From the multitude of factors that served as a basis for this reconstruction we shall single out two: the lower cost and availability of petroleum and the development of all kinds of transportation. While steam engines and steam ships began with coal, automobiles, tractors and aircraft from the very beginning used liquid fuel, which would be obtained most easily from petroleum. It is clear that for steam engines and steam ships, coal was traditional, in petroleum fractions were the alternative fuel while for motor vehicles and aircraft, it was petroleum derivatives that became the traditional fuel from the very beginning. And only when there was none of it or not enough of it left did they return to the alternative—coal.

This is what happened, for example, in fascist Germany which was cut off from sources of petroleum. There they created large plants for liquefying coal by various methods. Incidentally, what was meant by large at that time: in the peak year of 1943, in fascist Germany, for all the needs of the Wehrmacht and Luftwaffe they produced about 3.5 million tons of transportation fuel. Today we say—only 3.5 million tons! Indeed, this figure looks small if one takes into account that today in the FRG the volume of consumption of these fuels approaches 100 million tons with an overall volume of processing of petroleum of about 130 million tons. For comparison—in the United States the volume of processing of petroleum at the present time is about 700 million tons and the output of transportation fuel exceeds 500 million tons.

As we know, fuel is burned and the heat that is released is used for heating or is transformed into mechanical or electric energy—the most convenient, as it were, universal form of energy from the standpoint of distribution and consumption. The traditional system for transforming fuel energy is based on burning with subsequent utilization of the heat of the exhaust gases to obtain steam, and with this to obtain mechanical or electric energy.

With the invention of the internal combustion engine the system was shortened: the chemical energy of fuel is transformed directly into mechanical energy. In this revolution is the meaning of scientific and technical progress in energy engineering—the search for direct

transformations of energy. The MGD-generators exclude the steam boiler in the sphere of transformation of chemical energy of fuel into electric energy and thus increase the efficiency factor more than 1.5-fold.

Fuels are still mainly burned. They are burned in different ways and for different purposes. The boilers of electric power stations burn coal, gas, fuel oil and combustible shales. Until recently they also burned peat. One American electric company began to burn nutshells. Of course, there are technical nuances but in this technology there are many more things in common than there are differences. One can easily imagine an electric power station that can operate on any kind of fuel in turns. Even the changeover of thermal electric power stations (TES) from fuel oil to coal and back is a widespread phenomenon.

But in internal combustion engines this kind of replacement is impossible. A carburetor engine takes only gasoline, and a diesel engine operates only on diesel fuel. In exactly the same way, special fuels are required by jet, turbojet, gas turbine and other engines. Moreover, depending on the design of the carburetor, for example, each engine is intended for its own kind of gasoline. In countries with a developed transportation system they used no less than 2-3 grades of automobile and aviation gasolines, diesel fuels and jet fuels. This is technically and economically justified.

Let us turn to the classification of fuel not in terms of its origin but in terms of its application. The first large group consists of boiler fuels which serve for producing electric and thermal energy in the form of steam and hot water. As boiler and household fuels large quantities of natural energy bearers are used such as coal, gas, or wood. The second group is transportation fuels, which at the present time are obtained practically only from petroleum.

Thus it is necessary to distinguish the concepts of energy bearer and fuel and, correspondingly, alternative energy bearers and alternative fuels, and also the meaning and the task of alternative fuels in addition to or in partial replacement for existing ones. This kind of precision is extremely important in light of the immense and ever expanding possibilities of modern technology when it comes to transforming various kinds of energy. Here is an example. The Mobil Corporation (United States) is introducing technology for producing automotive gasoline from methanol. This gasoline is in no way different—even in terms of hydrocarbon composition—from the gasoline of an oil refinery. Will this be an alternative transportation fuel? In our opinion, everything depends on what the methanol is synthesized from. For it can be obtained through the gasification of heavy petroleum residues from the oil refinery but it can also be obtained from seawater. Yes, precisely from this! Or from ocean water. We know of a reaction of hydrolyzing carbon dioxide that produces methanol. This can be realized in the form of a technology that is quite feasible even with

existing technology. What does this mean? It involves expenditures of electric energy for electrolyzing water. Nonetheless, in the opinion of the American magazine *ENERGY CONVERSATIONS* (1977, 17, pp 97, 133), with inexpensive thermal electric energy this path may become effective.

And so the problem can be reduced to alternative energy systems and alternative transporters of fuels. As concerns alternative energy systems, this is not the subject of the present article. Here it is appropriate only to refer to the article of two Nobel Prize winners, Academicians N. N. Semenov and P. L. Kapitsa. (Footnote 2) It shows that neither solar nor geothermal nor hydraulic (including tidal), nor other exotic kinds of energy can be regarded as serious alternatives to petroleum, gas and coal. At the present time this alternative is nuclear energy, and in the future it will be energy of controlled thermonuclear synthesis. Let us note that the same viewpoint is held by all leading energy specialists and economists. The situation is more complicated with respect to transportation of fuels. This is what will be discussed here.

### Gas or Coal?

The only traditional transported fuels are petroleum fuels. Real alternatives to them can be:

compressed casing head gases (propane-butane);

compressed natural gas (methane);

alcohols and oils obtained from vegetable raw material, including through biochemical processing;

synthetic liquid fuels made from coal, shales, and gas.

Let us consider each of the aforementioned variants. Compressed casing head gases from petroleum processing make excellent automotive fuel that is high octane and ecologically pure. Difficulties arise only in organizing its distribution. Here it is impossible to avoid significant expenditures of metal on storage containers and cylinders for motor vehicles. But the main obstacle to extensive utilization of compressed gases in automotive transportation is their limited quantity and the existence of other more effective consumers.

Compressed gases are wanted by petrochemistry, agriculture and municipal and domestic services. Compressed propane is widely used for welding and cutting metal. The list of these consumers can be continued. If one proceeds from a satisfaction of their needs first and foremost and the advantages in terms of the total expenditures of initial raw material, then there is practically no compressed gas left for automotive transportation.

When compressed natural gas is used as a transported fuel there are difficulties because of the cost of equipment of the distribution network and specialized automotive transportation means, and the great weight of the cylinders, which increases expenditures of fuel per unit of transportation work. Many specialists are skeptical about methane as an automotive fuel, ruling out its use for passenger vehicles. But not everyone thinks that. According to data from the United States, in the country there are now 30,000 automobiles out of the entire automotive fleet (about 140 million) that are operating on natural gas. (Footnote 3) A changeover of 8 million motor vehicles that is earmarked in the future will make it possible to save almost 15 percent of the imported petroleum. This prediction is clearly optimistic. We think that life will make its adjustments. We shall give our justification for this statement below.

People are now writing a great deal about the utilization of biomass for producing automotive fuel. In the United States, there was a fuel called "gasahol" (derived from the words gasoline and alcohol), which is a mixture of gasoline and ethyl alcohol, including fermented alcohol. The recognized leader in this area was Brazil, with its tropical climate, immense sugar cane plantations, and surplus of labor force. This combination makes it possible to produce a sufficient quantity of ethyl alcohol for the needs of automotive transportation. As specialists write, in the next few years Brazil could replace up to 40 percent of the petroleum with ethanol. Without casting doubt on this estimate, let us note that on the whole this direction is not promising. In the first place, the production of alcohol through fermentation is fairly energy-intensive and capital-intensive. In the second place, in the majority of countries of the world there is not enough plowed land for producing foodstuffs. In our opinion, this direction is more curiosity than a serious alternative. There will never be inexpensive fermented fuel in spite of all the noise in the press. This is one of the false goals, just like the announcement of the utilization of vegetable oils as diesel fuel. It is also possible to run cars on French perfume and extract iron from wild strawberries....

The situation is more complicated with respect to the production of synfuels [SZhT:synthetic liquid fuels] from coal. A little history would be appropriate here. The greatest development of the process of the production of synfuels from coal came, as we have already said, during the Third Reich. But Germany was not the only producer of synfuels from coal. Before the war similar installations had been constructed in Great Britain and Italy. But then World War II came to an end, petroleum became available, and the production of synfuels from coal was halted, and the equipment of the installations was reoriented for the production of methanol and high alcohol. The last of the European productions was closed in the FRG in 1962.

But in 1976 in the Republic of South Africa the Sasol firm introduced a complex in which they carried out the process of the German researchers Fisher-Tropsch. But

in 1983 the general contractor of Westinghouse (United States) announced that work on the plan had been halted because of financial considerations. In other words, even enriched with valuable metals, diamonds, and with unrestrained exploitation of the indigenous population of the racist Republic of South Africa, the production of synfuels was not profitable. But possibly there were loopholes in the petroleum embargo and petroleum products arrived in the Republic of South Africa in one way or another.

Numerous technical and economic research products conducted in the United States show the ineffectiveness of modern means of producing synfuels from coal. It is all a matter of the low efficiency factor of the transformations and the corresponding utilization of the potential energy of the coal. Research shows that a higher efficiency factor is theoretically impossible to achieve.

Effectiveness of Transforming Various Sources of Energy

Initial Energy Bearer	Proportion of Energy for Obtaining Initial Energy Bearer, %	Product or Purpose of Transformation	Efficiency Factor of Transformation
Petroleum	2	Liquid fuel	95
		Gasoline	90
		Electric energy	35
Natural gas	1	Heating	74
		Electric energy	35
		Electric energy	35
Coal	2	Liquid fuel	65
		Gasoline	55
		High calorific gas	55
		Electric energy	30
		Liquid fuel	67
Atomic fuel	4	Gasoline	63
		Electric energy	8
		Biomass (ethanol)	35
Combustible shale	5-10	Heating	70
		Electric energy	15
		Electric energy	15
Solar energy	5-12	Electric energy	8
		Biomass (ethanol)	35
		Heating	70
Geothermic energy	6-15	Electric energy	15
		Electric energy	15

Further, let us say that more than half of all the mineral fuels go for producing electric energy. Hence the program requirement can be formulated as follows:

to make maximum use of coal for producing electric energy, freeing up petroleum fuel and natural gas;

for domestic purposes, to make maximum use of electric energy and natural and compressed gases;

maximum use should be made of the released resources for producing transportation fuels and raw material for petrochemistry.

The last circumstance is especially crucial for the European countries, including the USSR, for the depth of processing petroleum is not great and almost all the fuel oil is burned as energy fuel.

A comparison of coal with other sources of energy in terms of the effectiveness of the final consumption is given in Table 1.

By comparing the data in the table one can see that with the production of electric energy the effectiveness of the burning of coal, inert gas, natural gas, and petroleum fuel oil are the same: approximately 35 percent of the initial heat is used. For heating (municipal and domestic consumption) natural gas is much more advantageous. And it is quite ineffective to use coal for producing transportation fuels. It is not even half as good as petroleum. The same thing is true of shales.

Hence follows an extremely important and, at first glance, paradoxical conclusion: from the standpoint of economizing on local fuel resources the utilization of coal and shale for producing transportation fuels increases the overall shortage of energy bearers if one proceeds from the interreplaceability of mineral fuels in the structure of the fuel and energy balance. It is precisely here that one's starting point should be, for any other approach is methodologically incorrect.

### A Big Fuss About Synfuels [Synthetic Liquid Fuels] or the Command of the Times?

The aforementioned directions for optimizing energy consumption are correct, and we would even say indisputable from the balance side. But it is also worthwhile to take a brief look at the socioeconomic, political, and ecological aspects.

Let us begin again with the balance. In the United States they produce, as was already noted, about 500 million tons of transportation fuels. It makes sense to develop the coal industry and invest money in it if the degree of replacement is significant. Now about 40 percent of the transportation fuel is produced from imported petroleum. Let us imagine a task of reducing imports by half. This would mean implementing a program for the construction of synfuels plants with a capacity of 100 million tons of final products. This would require 600

million tons of coal, that is, twice the current amount extracted, as well as the construction of new mines and pits. Under modern conditions in the United States and other capitalist countries the cost of construction work and industrial equipment is rising sharply, mainly because of inflation. And the mining industry has always been distinguished by high capital-intensiveness, and today because of the increased requirements on technical safety, at the present time the fixed capital in the U.S. coal industry amounts to about \$6 billion. To double its capacities would require \$22 billion, which means increasing the proportional capital-intensiveness by a factor of 3.7. (Footnote 4)

Obviously most of the increase in the extraction of coal must be provided by strip mines. This takes considerable areas of agricultural land out of circulation.

The growth of mine extraction causes difficulties of a social nature. In spite of the increased labor productivity it is impossible to do without an increased number of underground workers. An increase in expenditures on wages is inevitable since the labor of miners is expensive, especially under the conditions of inflation. There are also possible difficulties in providing for labor force, since labor of miners is considered difficult and unprestigious.

And how does the reader like these lines from the American magazine SCIENTIFIC NEWS: "According to calculations of the corporation "Resources of the Future," for the United States the production of 2 trillion kilowatt hours of electric energy by a TES using coal will entail up to 6,000 deaths from occupational injuries and occupational diseases (including silicosis in miners), from 10,000 to 1 million cases of critical respiratory diseases in children, from 60,000 to 6 million chronic respiratory diseases, from 600,000 to 60 million man-day complaints from the elderly and from 900,000 to 10 million man-days of asthmatic attacks. These 2 trillion kilowatt hours using coal fuel will lead to a loss of 40,000-80,000 hectares of land." (Footnote 5) Incidentally, the name of the article is "Unpaid Accounts of Electrification." Is it necessary to increase the sizes of the accounts even more through the production of compressed fuel from coal?

All that has been said shows that there are no apparent reasons for creating a new branch for producing synfuels from coal. But the flow of articles is not slowing up. And each is based on an ironclad statement: yes, it is more expensive from coal! But petroleum is rapidly growing more expensive and the time is coming when the difference in prices for petroleum and coal will be such that liquefaction of coal is becoming comparable to processing petroleum in terms of expenditures.

This is one of the myths that give rise to false goals.

In our opinion, the price of coal will be set at the level of prices for fuel oil or somewhat lower, but only enough so that it will be somewhat more advantageous for the producers of energy still to use coal. And since the evaluation of fuel oil usually ranges within the limits of 0.7-0.8 of the price of petroleum, one can assume that in the future in capitalist countries the price of coal under the influence of the shortage of energy in general and petroleum in particular will increase, with a limit of 0.8-0.9 with respect to fuel oil or 0.5-0.7 with respect to the price of petroleum.

This conclusion, which we drew as early as the 1970's (see the aforementioned survey of Ye. V. Lazareva, Ye. B. Tsyarkin, et al.) is being confirmed. While in 1970, according to data of the UN European Economic Commission concerning European prices for imported fuel, the price per barrel of conventional petroleum fuel (in U.S. dollars) was for petroleum \$2, gas—\$2-2.50, and coal—\$3.60, in 1975 these figures were \$11.80, \$5.85, and \$12.15, respectively, and in 1980—\$32.50, \$23.99, and \$13.13, respectively. (Footnote 6).

By 1985 the prices of petroleum had decreased by 15-20 percent as compared to 1980, and the prices for coal had increased by approximately the same amount. There is still a clearly marked tendency toward equalization of prices of energy bearers. Uniform growth of wholesale prices for coal and petroleum is also typical of the socialist economy, which follows the economic practice of the USSR and other countries. With respect to capitalist countries, in future one should expect an equalizing of prices for coal and petroleum, both under the influence of the direct increase in current and capital expenditures and as a result of the capitalist competition.

Where are the roots of the widespread illusions? Let us return to recent history. Immediately after the shock of the petroleum crisis in 1978, in the United States there appeared one after another million-dollar projects for producing synthetic fuels from coal, shales, bituminous sand and other solid fuels. Numerous research corporations appeared and their numbers increased rapidly. The press had many kind things to say about their activity, giving the figures on the millions of dollars worth of expenditures on their development. It seemed that in a couple of years there would be no problem with transportation fuels. But the main thing was that the dependence on OPEC would be reduced to a minimum. One of the programs was even called "Independence."

The research boom continued 5-7 years. The 1980's introduced an element of sobering up. And while the enthusiasts of synfuels gathered articles about the prospects of coal, we looked in the serious professional press for "anti-references." Our collection gradually expanded. Here is what we read, for example, in OCEAN INDUSTRY, Vol 17, No 10, 1982: "The reduction of the need for energy, the stability of deliveries, and the increased bank interest rates have led to a reduction of research work and many projects have been put off until



the future. The overproduction of petroleum and the price reduction retarded the production of synthetic fuels. In the opinion of Texaco, in the year 2000 in the West there will be 0.24 million cubic meters of synthetic fuel per day in the petroleum equivalent (76 million tons). Expenditures on its production will amount to 0.8-1.2 trillion dollars. Recently two programs for synthetic fuel were closed down in Canada and Australia. In May 1982 they rejected the colony project for processing shales (Exxon and Tosco) since even in the stage of planning it became clear that there would be a sharp increase in the cost of the work." Through the project colony the state corporation "Synthetic Fuel" obtained loans for \$1.2 billion. But during this time work was halted on the project "Olsande" (Canada, \$11 billion). Somewhat later the aforementioned "Westinghouse Electric" halted the project "Sasol."

In 1982 the journal BUSINESS COMMUNICATIONS asserted that in 1985-1990 no more than 3-4 facilities would be put into operation under the condition of government subsidies (\$2 billion for each facility). And even then the output of synfuels was expected to be very moderate—7 million tons in 1985, 18.7 million tons by 1990, and 28 million tons by the year 2000. Here it was assumed that the consumption of coal would be 54 million tons and shale—115 million tons in the year 2000, with overall capital expenditures of \$65 billion (in 1982 prices). But even this extremely moderate prediction has not yet come true—in 1985 not a single industrial facility was introduced.

We also decided to test our forces in predicting events in the fuel industry of the United States. We say that in 1990 there will be no industrial production of synfuels in this country. This statement is based not only on the aforementioned facts. The increased interest rates of bank credit, the stabilization and even reduction of petroleum prices, and the regularity of supply will actually impede the creation of synfuels installations. Their creation will be held up even more by the effectiveness of measures for economizing on energy, mainly petroleum fuels, which we shall discuss separately. But the main role has been played by the refusal of government institutions to participate in industrial realization of completed scientific research projects. This is where they started leaving the ship. It is impossible to base serious projects on sand, even if it contains oil.

Here it is appropriate to ask a question that is traditional for such situations: who stood to gain by all the fuss about synfuels? The question is obvious from the very beginning—the petroleum monopolies. But why? Did the specialists working in these monopolies really not see or understand what was presented above, both with respect to the efficiency factor of energy transformations and the price ranges for petroleum and coal or shale? We respect the qualified American specialists and are inclined to think that they all understand. We even have evidence of this in print. So what was the matter?

Let us give our version of the events. As we know, in the United States there are fairly strict tax laws, including a progressive tax in profit and windfall profit. At the same time there are no taxes on philanthropic donations or donations to various funds, including research. We also know that frequently it is more advantageous for the companies to sacrifice certain sums, even significant amounts, to research funds so that the overall sum of taxation will be less. Thus a dual effect is achieved—both a commercial one and a social, propagandistic one. But there is also a third effect—usually those who make the sacrifices in one way or another acquire considerable influence in the management of the funds, sufficient to determine the subject matter, volumes and rates of research. The noble fool Andy Tucker was truly right when, according to O. Henry, he taught his friend Jeff Peters: There is nothing more advantageous than philanthropy! Let us remind the reader that these two gentlemen used their money to organize at one state university a department of philanthropomathematics, and they made a fairly large fortune at it.

But let us return to the oil companies who are just as noble as the O. Henry heroes. Here is what the newspaper NATION, NEW YORK wrote about this (quoted from the magazine ZA RUBEZHOM, 23 January 1981, No 4): President Carter is responsible for the following:

"incorrect economy policy and poor results (in spite of repeated appeals to put an end to the urban crisis and help the poor);

"bitter financial medicine that deliberately caused a recession;

"servility to the largest petroleum monopolies which gave rise to the program for 'synthetic fuel' which makes the corporations rich and exhausts the land."

We repeat that all the fuss about the gigantic plans for synfuels was precisely calculated political and economic disinformation of the petroleum monopolies in order to justify raising prices for petroleum products, and the main thing—in order to exert pressure on the petroleum exporting countries. It is quite clear that the leaders of the corporations understood that they would not be given government subsidies of \$2 billion for each synfuels plant that produced only 500,000 tons of petroleum products a year. And this is not what they were striving for. Their real goal was to imitate the futility, as chess players say, of creating a situation of Zugzwang, when the opponent is forced to make moves that are advantageous to us.

But we are seriously conducting discussions about the need to develop the synfuels industry. We even created an all-union production association. This is under the condition that we export many tens of millions of tons of petroleum and that the depths of processing petroleum is still far from that of the United States and even the countries of Western Europe.

If we increase the extraction of coal it will only be to replace fuel oil which, with deep processing, will produce no less than 60 million tons of transportation fuel. Thus in 20-30 years the problems of their production will be removed.

Incidentally, the questions of the technical policy of producing transportation fuels in the USSR is the subject for a separate and serious discussion. Let us say only that under the conditions of stabilization of the volumes of extraction and processing of petroleum and even in the event of a certain reduction of the volumes of processing, the reserves for increasing the removal of light fractions and economizing on fuel and transportation are such that it will not be necessary to turn to synfuels from coal for a minimum of 20 years. Such a normally optimistic conclusion of the author can easily be confirmed by indisputable figures.

### Savings—A New Source of Energy

The time has come to elucidate in greater detail the question of economizing on fuel—this new source of energy, as it is now generally called. We should not think that before 1973 everything in the world energy economy was in order and then suddenly the energy crisis flared up. A long time ago economists and energy engineers came to the conclusion that the energy bearers used by mankind basically cannot be reproduced and, alas, they are among the limited natural resources. They must be protected, there is no doubt about that. And these appeals were made constantly. The author recalls as early as the middle of the 1950's, when he first encountered the problem of technological processing of shale and in his coursework he had occasion to cite American authors who asserted that petroleum in the earth would last for 7-12 years and therefore the next few years it would be necessary to begin to obtain liquid fuels from shales from Athabaska.

It should be noted that the disinformation succeeded. Petroleum corporations are still causing a stir. But the worst thing (and the most dangerous) is that this disinformation has crossed the ocean and, without stopping in Western Europe, has spread to the USSR. Here is what happens: the FRG which, it would seem, God himself has made to work with synfuels, is in no hurry to get started on this work. And yet there is sufficient brown coal in this country. And Japan, whose only fuel resource is coal, is doing nothing.

Subsequently we became convinced that the situation with petroleum in the world was not so tragic. Periods of fear and euphoria, it turns out, are regularly repeated because of objective and subjective factors. The objective ones are success in the technology for searching, prospecting and extracting. The subjective ones are the policy of the monopolies and individual states. In order

that our statements not seem unfounded, let us give data concerning the dynamics of predictions regarding the estimation of the supplies of petroleum (Table 2) (Footnote 7).

The authors of the estimates are by no means dilettantes. These are qualified experts from Exxon, Mobil, Chase Manhattan Bank, the Department of Internal Affairs, the Geological Administration and others. The contradictoriness of the estimates illustrates the interaction and mutual influence of all of the aforementioned factors. But one cannot but note the tendency toward equalization of the estimates at the level of 300 billion cubic meters or a little more. And these were the estimates both before and after 1973. This means that it was not a matter of resource, and the causes of the crisis should be looked for in politics. And the jump in prices of petroleum was no accident. To a certain degree it was justified, since the prices of petroleum before 1973 (\$20-30 per ton) were at the level of the prices of soda water or much less than the price of Pepsi-Cola. It was all a matter of the spontaneity of the events. Therefore it would be more correct to speak not about a "petroleum crisis" but about a "petroleum shock" because of the sharp leap in prices that gave rise to increased inflation and political speculations like "a bushel of grain for a barrel of oil for petroleum-extracting countries" and other nonsense.

Table 2—Estimates of World Petroleum Supplies, According to Data of Specialists

Year	Billions of Cubic Meters	Author of Publication
1920	6.8	No data
1942	95.4	Pratt, Witt, Stebinger
1946	63.6	Duse
1946	88.2	Pochue
1948	97.0	Weeks
1949	161.0	Weeks
1949	238.5	Leverzon
1953	159.0	Macnaton
1958	238.0	Weeks
1959	320.0	Weeks
1962	198.0	King Habert
1965	394.3	Hendricks
1967	332.3	King Habert
1968	286.2	Riman
1969	214.7-333.9	King Habert
1970	286.2	Moody
1971	190.8	Warmen
1972	310.4	Yordy
1973	636.0	Odell
1974	320.0	Boniplace
1975	320.0	Moody
1977	302.1	MEK*

\* International Energy Commission

To be sure, there were also positive consequences. As Famusov said in "Woe From Wit" regarding Moscow after it had burned in 1812, "The fire contributed a great

deal to its decoration!" The "petroleum shock" of 1973 brought about significant progress in all areas of energy engineering. During 10 years the energy-intensiveness of the petroleum processing industry decreased by 25-30 percent, even though the depth of processing increased. The picture was similar in other energy-intensive branches, where it became advantageous to invest money in economizing on the energy bearers that had increased in cost. On the whole the energy-intensiveness of a unit of gross national output decreased in the United States by 24 percent during 1973-1983.

But the most significant and instructive thing is the reduction of fuel expenditures on transportation. During 1973-1982 the average annual consumption of gasoline in the 21 countries included in the International Energy Agency, which produced almost all the automobiles in the Western world, increased by only 5.9 percent, and the number of automobiles increased by 34.7 percent. There were more automobiles and they did not begin to drive any less (18,000 kilometers of annual travel per one automobile in the United States), but the overall consumption of gasoline in the aforementioned country decreased by 10 percent just during 1978-1982.

This entire reduction is the result not of radical transformations in technical equipment and technology, but reasonable utilization of obvious reserve. And there can be no discussion of radical changes in the immense world economy in 5-10 years. In principle the motor vehicles are the same, but the capacities were reduced to a reasonable limit, they were made lighter as a result of using new materials and design solutions, they modernized the system for fuel injection, combustion and carburetion, tires with new energy-saving characteristics appeared, and so forth and so on. As a result, while according to U.S. standards of 1979, the new motor vehicles that were produced should have used 12.4 liters per 10 kilometers of travel, by 1985 this normative was 2.5 liters. Here is the prediction from the DuPont firm for the United States (see Table 3).

Table 3

	1980	1990
Number of drivers, millions	110	125
Sales, millions of units	8.7	12.5
Automotive fleet, millions of units	139	177
Including:		
with carburetor engines	135	158
with diesel engines	4	19
Proportion of diesel vehicles in passenger fleet, %	6.1	16.0
Actual expenditure of fuel in passenger cars, L/100 km	15.3	9.5

The prognosis given here presupposes complete use of diesels for cargo automotive transportation and increased use of diesel fuel in passenger cars. This will

lead to greater savings on transportation fuel since the efficiency factor of diesel engines is almost a third higher than that of carburetor engines.

There are many sources for economizing on transportation fuels, beginning with the type and condition of highway pavement and ending with the manner of driving. Specialists from the FRG assert that simply by driving more efficiently it is possible to save 3-5 percent on fuel and justify expenditures on retraining the immense army of drivers as well as advertising.

But there are also more radical solutions for economizing on petroleum for transportation fuel. These include first and foremost their production from natural gas and especially casing head gas from petroleum extraction. According to data of Litton Energy Systems, a total of 588 million cubic meters of gas a day (equivalent to 193 million tons of petroleum a year) are burned for torches in the world. Including (millions of cubic meters per day):

Asia and the Near East	336
Africa	112
Latin America	56
Eastern Europe	56
Western Europe	28

It is very difficult to gather and transport these from the place of extraction to the consumers, and sometimes the expenditures make it inexpedient. Since compressed gas has a density of 0.4-0.45 it has to be shipped in specially equipped tankers with a cryogenic system for compression on board, which consumes a considerable proportion of the fuel that is shipped during a trip. And gas tankers are costly. And flares are burning in the deserts of the Middle East and in the Arctic tundra. But flares can be extinguished, and the gas can be gathered and processed. The most immediate technical solution is synthesis of methanol. The technology has been well developed and there are systems with a thermodynamic efficiency factor of more than 90 percent (the so-called three-phase firm of Chemsynthesis, the United States). Methanol installations can be assembled on self-propelled and towed barges and even on mobile platforms with a small capacity. As an example one can give the floating methanol plant with a capacity of more than 600,000 tons of methanol a year that was constructed by Japanese firms for Saudi Arabia (El-Jubail).

Methanol can also be used as a component for motor (and not only motor) fuel and as a raw material for producing standard gasoline and raw material for the most diverse kinds of organic synthesis.

In our opinion, the conclusions to be drawn from what has been said are obvious. Petroleum will remain the basis for the production and consumption of transportation fuels. To some degree, as it is necessary natural and casing head gases will be brought into production. There will be an energy streamlining of means of transportation

and transportation technology as a whole, which will lead to extremely significant savings on fuel. As concerns solid fuels, they will be used practically only for producing electric energy at least until the end of the century and the first decade of the next century. Hence an important conclusion: it is necessary to change our attitude toward research work for technological processing of coals, concentrating efforts on the fundamental directions. And, of course, we must stop attempting to create new technology on old foundations—catalytic hydrogenation or coal gasification. In principle, they cannot lead to success.

And effective new technology for obtaining liquid transportation fuel can be created only on the basis of new chemical and technological devices for transformation carbon and organic mass of solid fuels. These are still to be discovered.

#### FOOTNOTES

1. "Plan elektrifikatsii RSFSR" [The Plan for Electrification of the RSFSR], ed. by G. N. Krzhizhanovskiy, Gospolitizdat, Moscow, 1955, pp 64-65.

2. See PRAVDA, 28 November 1981.

3. NEFT, GAZ I NEFTEKHIMIYA ZA RUBEZHOM, No 11, 1984, p 57.

4. Ye. V. Lazareva, Ye. B. Tsyarkin, et al., "Perspektivy proizvodstva alternativnykh motornykh topliv" [Prospects for the Production of Alternative Motor Fuels], Moscow, TsNIITEINeftekhim, 1980.

5. Quoted from the article by N. P. Fedorenko, M. Ya. Lemesheva, and M. F. Reymers in the magazine PRIRODA, No 10, 1980, p 11.

6. "Ekonomiya energii—novyy energeticheskiy istochnik" [Economizing on Energy—A New Energy Source], translated from German. Moscow, "Progress", 1982.

7. NEFT, GAZ I NEFTEKHIMIYA ZA RUBEZHOM, No 10, 1979, p 38.

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#### Electric Energy Used Innovatively

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[Article by Yu. Ya. Rodin, journalist (Moscow): "The Effect of Initiative and the Fruits of Indifference"]

[Text] All branches of industry, from metallurgy to light industry, have one feature in common: not a single one of them cannot exist without electric energy. I would say that energy is the breath of industry. In exactly the same way that we notice the air when we breathe, the significance of electric energy becomes clear as soon as it is turned off. But if in daily life turning off the current even for a half hour causes discomfort, in industry this leads to catastrophic consequences.

Thus in the summer of 1985 at plants of Novokuznetsk with an interval of a month there were two, as Kuzbass energy engineers assert, "small failures." In one case the main line giving power to the pumps that bring water to the Western Siberian Metallurgical Combine was turned off for 4 hours. Still the Zapsib [Western Siberian] continued to receive a partial supply of water for cooling blast furnaces under the emergency system, and this eased the disaster. But at the Kuznetsk Metallurgical Combine, because of the lack of electric energy, a blooming mill and several furnaces were shut down.

In both cases the reasons for the emergency were mistakes of the service personnel. The guilty parties were punished. But each of the combines lost several million rubles during these hours. This includes the cost of restoring the damaged equipment, losses from idle time and subsequent repair, and the value of products that were not produced. And the reasons for the emergency lie deeper than the mistakes on the part of workers.

Let us take a look at what the Kuzbass energy system is. It consists of stations constructed dozens of years ago; the oldest of these—the Kemerovskaya GRES—was 50 years old in 1984, and the youngest—the Belovskaya GRES—during those same days celebrated its 20th anniversary, which for energy installations is a sign of aging. Reconstruction as such (if one does take this to mean planned preventive repair of equipment) has been done nowhere except at the Kemerovskaya GRES.

Of course it is easier to ask questions than answer them, and therefore the chief of the Rayon Energy Administration (REA) Kuzbassenergo, G. M. Polonyankin, answered my questions about the state of affairs in the system of which he is in charge precisely, I would even say summarily.

"How do you explain, German Mikheyevich, the fact that the majority of stations of the system are obsolete and worn out, but there is nowhere even a hint of the beginning of reconstruction?"

"As you yourself understand, this can be explained in various ways," the chief of the REA understands that the question does not indicate responsibility of Kuzbasse-nergo but, being a direct and candid person, he does not try to sidestep the issue. "I could, of course, claim to be a 'little man,' on whom nothing depends and try to send you to a higher level. But that would be only nine-tenths correct. In fact, all funds for energy construction and reconstruction are concentrated in the hands of the USSR Ministry of Power and Electrification. During the past 10 years the ministry has refused all of our requests. My conscience is clear as concerns everything the REA has undertaken in order to update the capital. But at the beginning of the conversation I said that there is one-tenth that will not let me rest."

"And what is that one-tenth?"

"The experience of one of our directors. Have you already been to the Kemerovskaya GRES? The sharp wit and resourcefulness of Nikolay Nikolayevich Peters, the director of this GRES, is an example and a reproach to everyone else. Obviously, it is easier to develop one station than an entire energy system...."

Before turning to the affairs of the Kemerovskaya GRES and its director, it is necessary to give some explanations. In Siberia today there are thermal electric power stations and those that operate on hydraulic energy. The thermal ones, in turn, can be subdivided into two groups. One includes electric power stations of the so-called condensor type, at which all the energy of the heat obtained from any fuel is processed exclusively into electricity. This way a considerable quantity of the thermal energy produced with the steam is "discharged" into the cooling bodies of water.

The electric power stations of the other type salvage all of this heat. The heat is utilized for heating residential building, industrial enterprises, and also for producing industrial steam that is necessary for certain productions. These stations are called thermal electric stations (TETs) as distinct from stations of the condensor type, which are usually called GRES (state rayon electric power stations). This subdivision is extremely arbitrary, and frequently a GRES will also produce heat; but the TETs can also operate with condensation under certain conditions, for example, in the summer.

Both types of thermal electric stations can operate on coal, liquid fuel, and gas. All the fuel is usually translated into unified units of "conventional fuel" according to their calorie content. Even without being well-versed in the theory of energy engineering, the readers have already understood that the energy from fuel is used less effectively at condensation electric power stations than it

is at TETs. But from this one cannot draw the correct conclusion that condensation GRES's do not have a right to exist. In places where for various reasons it is advantageous to burn coal locally and transport electric energy through pipelines, and there are no consumers of heat nearby, they will continue to be constructed and develop in the future. Such, for example, are all the large GRES's that are in existence and are being constructed in Ekibastuz and the Kansk-Achinsk fuel and energy complex.

But in the Kuzbass, where the majority of housing in cities is heated by a multitude of heat boilers, there is a catastrophic shortage of thermal electric power stations. It is paradoxical, for example, that boilers heat the city of Belovo while the Belovskaya GRES (of the condensation type) discharges all of the heat from the steam that is produced into the water reservoir year round. And in Belovo, a city with a population of 100,000, there are large industrial enterprises that are in need of heat. In order to obtain it in boilers, for 8 months out of the year they burn tens of thousands of tons of coal. And yet the heat that is discharged into the water reservoir would be sufficient for heating three cities the size of Belovo!

To be sure, the energy engineers proudly state that in the water reservoir because of the heat they are able to propagate fish, but this can hardly make up for the economic and ecological losses from such a division of methods of obtaining electricity and heat. Boilers in Belovo smoke up the sky all winter to such an extent that one can see white snow only a long way outside the city.

This does not benefit the economy either. The proportional expenditure of fuel at the Belovskaya GRES in the first half of 1985 was 336.0 grams of conventional fuel per 1 kilowatt hour, while at the older Kemerovskaya GRES, which salvages discharged heat, the expenditure was much less—199.9 grams per 1 kilowatt hour.

But it is not only the boilers in Belovo that smoke up the skies. In many other cities of the Kuzbass the heat is also obtained from numerous outdated boilers which are extremely uneconomical and a large part of them are in disrepair. The efficiency factor of any of them is several times lower than at even the oldest of the TETs's. It is no secret that today the Kuzbass consumes for its own needs much more energy than it should with the modern level of thermal energy engineering. At the same time they do not rule out the possibility of emergencies with a shortage of heat in the cities. The blame for this lies with the unresourcefulness and short-sightedness of the policy of the USSR Ministry of Power and Electrification in the area of planning and distributing energy engineering facilities in this most important industrial region. Did they really not know 20-30 years ago, when the main GRES's of the Kuzbass were being planned and constructed, that the most economical and convenient means of heating is the utilization of heat obtained from TETs's? Was it not known at that time that the heating of residential and public buildings requires up to 30 percent

of all the fuel that is extracted? Nonetheless, along with a number of small uneconomical boilers they constructed only GRES's of the condensation type.

Forgetting that it is the producer of all kinds of energy—both thermal and electric—the Ministry of Power and Electrification has constructed the more “report-intensive” condensation GRES's, thus giving the illusion that everything is all right. Incidentally, up until quite recently the energy system of the Kuzbass has exceeded the needs of the region by many millions of kilowatts of installed capacity and has transferred surpluses to other areas. But Kuzbass industry has been developing while the electric stations have been aging and have never been reconstructed.

The danger of inaction in places where immediate capital repair has been needed, was obvious even before, but it became clearer in the winter of 1984-1985. This winter is frequently called “unexpectedly severe” although for Siberia such winters are more the rule than the exception. There were individual interruptions in heating in practically all the cities, even the large ones such as Novosibirsk, Novokuznetsk or Barnaul, but these were still “interruptions.”

Here is a case that deserves individual consideration since, like a drop of water it manifests all the most typical circumstances encountered by energy engineers of the Kuzbass. In 1934, when Kemerovo was just beginning to be constructed, on the left bank of the Toma, which supplies water for about 4 million people in Kemerov and Tomsk oblasts, they constructed the Kemerovskaya GRES, the offspring of the GOELRO plan. As the city grew, the electric power station, which initially operated with condensation, was gradually transformed into a TETs, and the heat that was previously discharged into the Tom was saved to heat the city. Now it operates 5,200 hours a year as a TETs and the rest of the time it is a condensation station.

Kemerovo is now one of the few cities of the Kuzbass where a large proportion of the residences and industrial facilities are heated through the TETs, although there are still a number of small departmental boilers. During the war years, and afterwards, with the construction on the right bank of the river of several large plants, the Kemerovskaya TETs was constructed there, and was completed and expanded during the postwar years. Out of the kindness, or rather unkindness, of the Ministry of Power and Electrification, by the winter of 1984-1985 this TETs was overloaded and had no reserves. When any system is overloaded, and it is then necessary to take more from it, as a rule, there is a breakdown. This year because of the confusion in the heat supply for the city of Biysk, which is also included in the consolidated energy system of Siberia, for several weeks multi-apartment buildings were without heat during the most freezing weather and the residents had to evacuate. This is an extreme case, and things have not come to this point in

Kemerovo. But when the Kemerovskaya TETs began to break down little by little, hundreds of buildings in a number of industrial enterprises were without heat for an hour.

The problem did not reach the point of evacuating the population, but until the normal operation of the TETs was restored, the temperature in the residential buildings ranged around the minimum permissible level, and several plants, as they say, “were sitting there freezing.” Naturally, behind each such event there are people and it is necessary to search them out as soon as the first shock is over.

The director of the Kemerovskaya TETs, A. V. Alekseyev, was punished through the party line and “put on a pension.” It would be wrong, of course, to understate his guilt—only the energetic intervention of the REA and related enterprises prevented possible catastrophic consequences. But in his own defense the director presented a pile of reports in which he had warned various levels and various supervisors hundreds of times, right up to the ministry, that the TETs was critically in need of reconstruction. The position of the USSR Ministry of Power and Electrification and the former minister, L. S. Neporozhnyi and the immediate supervisor of Glavvostokenergo, A. F. Dyakov, who has direct jurisdiction over the Kemerovskaya TETs, looked surprisingly simple: “It is working? Let it work. Let it fall apart and then we will talk.”

And so it turned out that A. V. Alekseyev, an unassuming person who had experienced years of inertia, sent substantiated requests to the REA and the Ministry of Power and Electrification and, having received no positive answer, put his papers into the files thinking that they would protect him if he needed it. But inactivity and the hope that everything would take care of itself did not save him. The serious irregularities that were, as they say, in evidence and which could have been prevented, also remained the subject for reports. And then came the “unexpectedly severe....”

Absolutely all of the authorities on energy engineering of the Kuzbass with whom I spoke asserted the same thing: the Ministry of Power and Electrification in recent years had avoided investing funds in reconstruction. Apparently many of them, including those who held leading posts in the ministry, had the idea of putting into operation the largest possible number of new facilities with many millions of kilowatts—this was both prestigious and noticeable. After this came triumphant reports, bonuses, and awards. And if they were to act sensibly and restore the TETs that was breaking down because of old age, it would have been necessary to spend up to 10 million rubles and there would be no millions of kilowatts with the bright reports about it. Need one ask where the main resources would go with such a selection?

Thus reliability and a scientifically substantiated approach to the distribution of thermal electric power stations was sacrificed in favor of prestigious construction projects.

It is not inappropriate to note here that the very reconstruction of thermal electric power stations that were constructed 20-30 and more years ago in some places is a difficult task. Strictly speaking, it is almost impossible to carry out reconstruction such as, for example, in machine building or in other branches where in old buildings standing on old foundations they install new machine tools and lines and in a number of electric power stations. Now, when the party has taken a course toward reconstructing industry and changing the investment policy in favor of modernization, one can see especially clearly the defects in the plans used to construct many large GRES's of Siberia and the Kuzbass 2 or 3 decades ago.

Practically all of them need to be restored. Even the youngest of them, the Belovskaya GRES, will soon require replacement of all the energy equipment. The steam turbines and the equipment directly linked to them, even if they are regularly inspected and tested, and all the necessary planned preventive repairs are conducted, with time will break down completely. The fatigue of the metal that is operating under extreme temperature and pressure conditions makes it impossible to utilize this equipment for very long. We are sometimes delighted to read that such-and-such an enthusiast is still working with a prewar tractor or driving one of the first postwar motor vehicles, and doing better work with it than other people do with new ones. But the economic pointlessness of using less productive old equipment is obvious. To be sure, at least this equipment is not dangerous. But a turbo aggregate that has served out its time becomes dangerous. Therefore there is no justification for inertia when replacing such equipment.

Reconstruction is necessary, but how does one carry it out? The first sets of equipment with medium pressure were replaced by boiler and turbo aggregates with high pressure. Today at stations of Kuzbassenergo, there are more than 30 kinds of turbo aggregates with various capacities and purposes in operation, and many of them have been in industrial production for a long time.

The plans for new stations of the country include energy blocks with capacities of 300-500 and even 800 megawatts, which are considerable more economical than their predecessors. But in all of the GRES's of Kemerov Oblast there is not a single turbo aggregate with a capacity of more than 200 megawatts and, correspondingly, all of these stations are intended for energy blocks with small capacities, from the foundations right to the buildings for the electric power stations. So even if they did not replace the condensation aggregates in certain cases with heat-producing ones, but simply replace the

old equipment with new, the energy engineers would encounter insurmountable difficulties since sets of equipment with these sizes are no longer produced.

Above, when comparing condensation and heat and electricity-generating equipment, I discussed the advantages of the latter over the former with respect to economizing on fuel. It is no less important that such a replacement produces significant savings of human resources. Thus, for example, the changeover of two energy blocks as the Surgutskaya GRES to heat and electricity generation released about a thousand people because of the small boilers that were closed down. The annual savings amounted to 280,000 tons of conventional fuel not to mention everything else. And, after all, Surgut is considerably smaller than Belovo or Prokopenvsk, which in the wintertime is blanketed with smog from hundreds of boilers.

Yet all the plans used to construct the GRES's of the Kuzbass are unique and have no analogues. Not a single one of them envisions the future of the station after the equipment has served its time. It is possible to expand such stations only through additional construction, but not by replacing less powerful blocks with more powerful and economical ones.

One clear example: against the back wall of a major building of the Belovskaya GRES for more than 20 years rust has been gathering on a 150-ton assembly crane, which was used sequentially to assemble all six of the energy blocks. This unique crane should have been used to expand the station, which for some reason never took place. But we are not speaking about the abandoned crane that had cost tens of thousands of rubles. I simply emphasize that initially the construction of the main building was done in such a way that in the future it would be possible to build onto it, to expand, but—God forbid—not to reconstruct it in any way.

Under these circumstances how does one update the station? Is reconstruction possible? And at what price? I took these questions to the Kemerovskaya GRES, which, as was said above, began its life as a condensation station and now operates for a large part of the year under conditions for generating heat and electricity, heating the entire central part of Kemerovo.

This electric power station is one of the few even now that annually increases the output of electric energy and reduces the proportion of fuel. It is appropriate to note that the attitude of the Ministry of Power and Electrification toward this station is not very different from the one it takes toward other GRES's. But this is one of the first in Siberia and in some respects even the first in the country to introduce the achievements of science and modernized equipment.

For many years now the Kemerovskaya GRES has been in a permanent state of reconstruction. The main successes of recent years have been linked to the name of

Nikolay Nikolayevich Peters, who for the past decade has been working at the GRES as the head engineer and then the director. And he began his labor activity here as a machinist. Being a courageous person with initiative when it comes to justifiable risk, Peters is extremely objective and his modesty is not just on the surface if some of the successes of the GRES come from experience from outside. An interesting example in this respect is the introduction of the PVK—a method of moving coal dust to the furnace blocks under pressure. The very method, which brought to the station significant advantages in operation, savings and repair, is hardly a brilliant innovation. Developed about 30 years ago in the all-union thermal technical institute (VTI), this method was not introduced into practice, even though it was the latest word in world thermal energy engineering. But do we not have enough scientific developments that come back to us after having been utilized abroad?

In a word, the method, which promises a great deal, was successfully buried by the Ministry of Power and Electrification for many years. Its real birth took place in the Kuzbass where they simultaneously introduced this "old innovation" at the Tom-Usinskaya and Kemerovskaya GRES's. And Nikolay Nikolayevich, with obvious satisfaction and pride, having demonstrated the device and told us how much fuel it saves and how it improves the operation of the boilers, reminded us several times that the large amount of credit for its introduction goes to workers of the Tomsk-Usinskaya GRES. He was bothered not by the priority but by the real advantage for his station.

A necessary digression: very frequently in recent years the press has introduced us to leaders of various ranks who, in order to achieve a positive result in their practical activity, have had to violate various management instructions and legal norms. In his position as director, Peters never violated these norms. The personal initiative of the GRES director never went beyond the framework of the "allowances" of his position. But, as it turns out, much can be done if one works intelligently and with a desire in any management position!

Nikolay Nikolayevich considers one of the most important areas of his "struggle" to be the control over the plans for partial reconstruction of the GRES, which abound in imperfections. Let us take just a particular case but one that is important for the station: the plan for unloading the structure. Here it is necessary to go back to when the GRES originated.

One of the smallest in the Kuzbass, the Kemerovskaya GRES, however, in the winter and during peak moments consumes up to 9,000 tons of coal a day. And these thousands of tons of coal, now as 50 years ago, are unloaded by hand! In order to eliminate this anachronism, after many years of red tape, at the end of the 1970's through the efforts of construction organizations the Ministry of Power and Electrification began to construct an unloading device according to the plan of

the Tomsk Division of the TEP, which takes into account the latest achievements in equipment...from the 1950's. A closer examination of the plan showed that it was "standard" in the very worst sense of the word—it in no way took into account the specific features of the Siberian winters. Neither a gallery for feeding in the fuel nor a system for overturning the cars was envisioned for this work, which takes place at temperatures lower than -10 degrees.

"We frequently encounter poor quality sometimes simply unintelligent plans," says Peters, surprised, "but it is difficult for us to influence the planners during the stage of development of the plan. We are not allowed to get near it, and when the plan is completed, it is already too late to change it. The institute that created the semimanufactured product is responsible to the Sroybank for the completion of the plan. There are no real—I repeat, not formal but real—levers for influencing the clients. With the policy in existence in the system of the USSR Ministry of Power and Electrification we can speak responsibly as equals and, if necessary, questions solutions, with the plants that manufacture turbines and other equipment we cannot really question the quality of the plan for reconstruction."

The Kemerovo workers are not the only ones who have problems ensuing from plans that have cut corners.

Departmental separation is a bad thing, but it is even worse when the separation is between neighboring main administrations of the same ministry. The system: "Less expensive plan + bonus = significantly more expensive reworking" is not only a moral vice, but is economically disadvantageous to everyone except, perhaps, the planners. And even they, when receiving their bonuses, hide their eyes although, as they say, money is money....

"Just think: in the plan for the gallery for feeding in fuel," says N. N. Peters, "they did not envision heating. The standard plan is intended for the middle latitudes and, not thinking, they did not adjust it to our conditions as though the Kuzbass were the Kuban. One wonders how long a rubber belt will operate at -20 degrees C. It is supposed to handle 9,000 tons a day, and in freezing weather it could break in a half hour. So is the coal to be moved in wheelbarrows? No, the standard planning is good only when one uses one's head. But then after the plan is approved and paid for, nobody will lift a finger to get rid of the obvious stupidity in it."

The workers of the electric power station had to install heating in the gallery, in departure from the plan. They could do nothing else. I saw another "correction-deviation" from the plan with my own eyes. According to the plan for those same Tom workers at the GRES they created a thawing device made of 16 cars intended for thawing coal that came up from the mines frozen. This device is a long covered gallery with heating pipes in the walls. According to the plan, in 6 hours the solid mass is



thawed out and the fuel falls through hatches in the railroad cars of its own accord. But here again they had a "paper" strategy which was far removed from practice.

This was corrected by young engineers and workers of the GRES headed by the head engineer, A. V. Benediktov. Now in the walls of the defrosting gallery, they have installed additional pipes through which hot air comes from the GRES. The direction of the stream is calculated so that it can cover the entire inside of the car. Only after this were they unable to unload coal in the winter without interruptions and idle time of the cars.

This episode comes from the struggle for reconstruction of the electric power station.

The builders refused to deviate from the plan. In order to create the appearance of working according to the plan, the director had to push the developments of his engineers through the Soyuztekhnenergo.

I liked Nikolay Nikolayevich's attitude toward his young workers, about whom he said:

"The economy, of course, is not football; it must be based on young workers and young forces. But if one loses the correct ratio between young people and experienced workers one can create a difficult personnel situation...."

It is generally noted that young people are the ones who are responsible for a large proportion of the proposals concerning updating the old GRES. Young workers and engineers suggested, for example, using dry ash to build roads and pave surfaces, and they have made many valuable efficiency proposals.

Perhaps it is not only in the Kuzbass but in the country as a whole that there are not enough other GRES's which could boast of being in operation for more than 30 years. A solid combination of young forces and experience produces excellent results.

Energy engineers have such an important concept as the coefficient of the utilization of installed capacities. At the Kemerovskaya GRES it has been 90.6 percent in recent years. This is not simply a very high percentage; it is 15-30 percent higher than at other thermal electric power stations in the Kuzbassenergo system. Here they produced and delivered to the consumers in the first half of 1985 3,066,000 gigacalories of heat, and this is one-fourth of all that was produced at electric power stations of the Kuzbass. And the Kemerovskaya GRES is not simply the oldest, but also the smallest in the system in terms of installed capacity. During 1984-1985 the collective of the station, as a result of modernizing individual units and systems of equipment, provided for an increase in the output of electric energy of 25 percent with a reduction of 3 grams of the proportional expenditure of fuel for each kilowatt hour that was produced. These grams which seem almost insignificant at first

glance, made it possible to save the national economy 12,500 tons of fuel during the year. Now, after the startup of Boiler Aggregate No 14, the Kemerovskaya GRES has become the largest in the Kuzbass in terms of the production of heat. The number of workers at the electric power station, in spite of the fact that the capacities have almost doubled and there have been significant savings, has dropped from 1,800 to 780 people. One could hardly find another enterprise at which the output of the basic product—in this case electric energy and heat—has increased severalfold while the number of workers has decreased almost by half.

Time has set difficult problems for energy workers of the Kuzbass. In one of the strongest regional energy systems of the country there appeared a shortage of production capacities. Of the maximum (peak capacity required for Kuzbass industry of 4.9 million megawatts, their own electric stations produce only 4.2 million. For 5 years now the Kuzbass has not been a supplier of energy to other systems but a consumer. And it does not always manage to satisfy all the needs even using the energy that comes from outside. For many years, they have squeezed all they could out of the old energy stations of the Kuzbass while the necessary reconstruction was put off until the future and elementary reason gave way to "perhaps it will go away." Many middle managers reconciled themselves to this and in some places the predictable end has come, as it did at the Kemerovskaya TETs.

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### Problems With Children's Footwear Production

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[Interview with P. Z. Litvinchuk, director of the Experimental Footwear Factory imeni 60-Letiye SSSR (Mogilev) by Ye. Lysaya: "The Children's Assortment and Indicators"]

[Text] Ask any footwear worker: "Which assortment is the most difficult?"—and without even hesitating they will say: "The children's," since we have more trouble with this than we do with adult footwear: you have to select bright colors of leather and combine it so that the item will look attractive, and you have to think of some interesting finishing, and there is no benefit...children's footwear produces almost no profit and many times are unprofitable. Footwear associations cover these losses from the high profit from fashionable women's and men's footwear. Enterprises that specialize only in the children's assortment have it much worse. This is explained largely

by the fact that there are very few of them in our country and that the demand for children's footwear is poorly satisfied while there is a clear shortage of products for the smallest children.

How did the new conditions for management and the economic experiment that was conducted in light industry in Belorussia affect the development of the production of footwear for children? At the quest of the editorial staff this is discussed by the director of the Mogilev Experimental Footwear Factory imeni 60-Letiye SSSR, Petr Zakharovich Litvinchuk, who has been in charge of this since 1965. Under his leadership the factory has become a large specialized enterprise and has attracted the interest of consumers far beyond the republic. In the Baltic countries, the Caucasus, and Central Asia they are trying to increase orders for Mogilev children's footwear. When the cosmonaut P. I. Klimuk returned to the homeland, to Belorussia, and found out about the factory's items, he arranged for them to deliver footwear from the Mogilev factory to the young residents of Zvezdnyy Gorodok. But the demand for children's footwear is not being satisfied, even in Belorussia itself, and thus only 10 percent of the products from the factory go outside the republic. Even in the stores of Minsk, Mogilev footwear is a rarity and if one can find it, it doesn't stay in the stores very long.

[Question] Light industry enterprises of Belorussia were the first in their branch to experimentally test the new conditions with management. Taking into account the experience they have accumulated during 2 years of the large-scale experiment, the economic mechanism has improved throughout all of the country's light industry which, as we know, has changed over fully to the new conditions. I should like to hear your opinion about what has changed in your work since the beginning of the experiment and the changeover to the new conditions for management?

[Answer] One thing produced by the experiment that is undoubtedly positive is the strengthening of contractual discipline. Now the fulfillment of the delivery plan by 100 percent is the alpha and omega of our production and economic activity. No one at the factory can even imagine that the plan according to the assortment and orders of trade will be unfulfilled even by one-tenth of a percent. One hundred percent fulfillment on the one hand is the realization of our responsibility to the consumers and, on the other, the main source of our more extensive opportunities for economic incentives for the collective since other sources of increasing the material incentive fund—increments for product quality, for delivery of items with the index "N" (innovation)—are not now in effect for the children's assortment. I shall discuss this in more detail later.

[Question] Many enterprises think that 100 percent fulfillment of deliveries is an almost impossible condition, since not everything depends on the collective. Interruptions can happen by the fault of any of the partners in production....

[Answer] Of course, no one has insurance against interruptions. But the significance of the indicator of deliveries is that it causes people to think about how to avoid interruptions or prevent them and how to improve the organization and control of production and sales, that is, it increases responsibility and stimulates a search for ways of more flexible and dynamic control.

For our enterprise 100 percent fulfillment of deliveries is extremely difficult since the factory is an experimental one and hence it has a high percentage of updating of the equipment and relatively small batches of items. In 1985 we updated the models of the footwear we produced by 100 percent and introduced 75 new models during the year with an overall volume of production of 1.75 million pair of shoes.

It is not difficult to imagine that it was much more difficult for us to fulfill deliveries by 100 percent than it would be under ordinary conditions. But still, as practice has shown, it is possible. What was done to accomplish this? First of all, we established a closer connection between the planning division and the division for preparation of production and sales. The new quarter or semester would just be beginning and we would already be looking through all the subsequent months: which models would sell without much difficulty, which ones would entail complications. If we could see that some model of product was lagging behind schedule, we would temporarily divert some of the products from the lagging flow line to a flow line where a supply of items has already been created. An especially important aspect is that by the end of the month, we had two-three shifts' worth of products in supply. In other words, that which is included in the orders and deliveries contracts we had to manufacture no later than the 29th of the current month. Only then would we manage to give the product to trade and obtain commodity and transportation invoices. In order to maintain this approach, we start up production more rapidly. As a rule, beginning on the 25th of the preceding month the cutting and preparation shops are working on the planned assortment for the next month.

During the first year of the experiment our partners also contributed in all ways to our fulfillment of the delivery plan. We had almost no interruptions in supply and received materials that were closest to the specifications we needed. Now all light industry enterprises are operating under the new conditions. We no longer have our privileges—orders for materials with the red mark—"Experiment." I will not hide the fact that it has become more difficult for us without the priorities in supply. For instance, Vobruysk Leather Plant sent a letter with a request that we take back our orders for certain leather goods. These were leather goods of bright red and orange tones in various shades. One could understand the director. If he did not receive the consumer's agreement to replace the raw material, he could not fulfill his delivery plan. The reasons for the replacement were quite respectable. The country does not have enough

good dyes, fillers and other chemicals, and we have begun to import less of them. Of course, I could have gotten the director off the hook, but then on the counters of the stores there would have appeared footwear of blue beige and black tones. And, after all, this is children's footwear, where the color and the finishings play an especially important role. The greatest interest is manifested in combined footwear made of leather of bright, rich colors. Therefore, with all of our desire to maintain good relations with the suppliers, we were forced to insist that he send us what we had ordered. All you have to do is excuse them once or twice and then it is hard to get off from this path.

It is especially dangerous to be mutually indulgent within the industry, regardless of what this refers to: technology, discipline or adjustment of the plan. The difficulties in production are unavoidable. One can search for ways of overcoming them or one can use them as a shield to protect everything. In order for concessions not to become the norm of life, it is better not to make them at all.

[Editorial comment] In the planning and economics division of the factory they told us: "Litvinchuk has achieved a revolution in the color spectrum. He has completely eliminated the output of children's footwear in dark and boring tones and nothing can stop him. The director is also implacable when it comes to deviating from the models. Previously if one model or another did not turn out well in production, the shop chief or the technologists tried to ask to have it replaced or to make a deviation from the model. But then they became convinced that this was useless. The psychology of the workers changed, and now efforts are directed toward finding a way to bring the intended model to the consumer."

If one visits the Mogilev Univermag or the House of Footwear one can get an idea of the attitude toward the factory's products.

"We barely get a chance to put the items on the shelves," says the senior salesman of the Univermag, L. M. Amalkav. "The customers are especially interested in slippers for little girls—they are fashionable, bright, and multicolored. We would like to have the factory produce more military-type and school footwear. Now the products for schoolchildren have to be ordered from other cities and they stand up poorly against the assortment of the Mogilev factory."

In the House of Footwear there is a special section for the local factory. It is attractive both in the way it is set up and in its content. To be sure, it is incomprehensible why the arrangement could not be equally attractive in the neighboring section, in which the children's footwear from other factories is sold. But that is a different discussion. In any case, the demand for Mogilev products is justified by the footwear itself.

"It is difficult to compare," say the salesmen, "because we order from other enterprises that which we cannot get from our own factory, but the comparison would not be in favor of the others." And this is true. The two sections are next to one another, and the contrast is significant. In one there are monotone red girls' slippers. The material is not bad, the dying is fairly good, but the products do not look attractive because it is a traditional model, it entails no imagination, and no attempt has been made to decorate the item. The experimental factory, on the other hand, works very hard at searching for interesting models.

[Question] How is the design and introduction of new items into production organized?

[Answer] We used to develop the items ourselves. Then we switched over to working with the republic House of Designs. We submit the orders for innovations and receive the prepared design. We pay a decent price for them. But I can guarantee you that through our own efforts we could not reach this level of development of new items. The House of Designs has qualified personnel who concentrate on searching for the new. They undoubtedly know more about the modern tendencies in design than any other enterprise, just as they know more about new materials, accessories and so forth. They have good contacts with the All-Union Institute of the Light Industry Assortment and with other scientific research organizations of their own branch as well as associates. There are 3-4 specialists at the House of Designs who concentrate only on the development of items for our enterprise. The factory has four of its own designers. Their task is to coordinate new designs with our production and technical conditions. Through our own forces we could not create 60-75 new designs a year and still get them into production.

It takes us an average of 20 days to put a new model into production. First, an experimental batch of 12 pairs is manufactured, and then 120 pairs, and after 20 days the product goes onto the flowline. We have four all-encompassing flow lines, from cutting to the assembly and sewing shops. If necessary each can be rapidly switched over to an other item, which we sometimes do when some flowline is not managing to fulfill the assignment and others are creating a surplus of items. The mobility of production and the rapidity of changing over to new designs is achieved because of working according to network schedules.

Unfortunately, many difficult problems are related to equipment. We have technical equipment for increasing the volumes of production—help yourself to as much as you want. But it is almost impossible to obtain anything suitable for obtaining product quality and increasing labor productivity.

We need sets of equipment for forming the soles and automated assembly lines. In 1986 the factory was allotted only one automated machine for assembling

semimanufactured pieces. Our slippers of the "mocassin" type are in great demand. They are sold out on the first day they arrive in the stores. But it is impossible to purchase equipment for producing them. During the first year of operation under the new conditions, as a result of increased profits, we managed to more than double the fund for the development of production. The funds were directed toward technical reequipment. Unfortunately, we did not manage to acquire many of those machines that were needed.

We should increase the output of equipment for the footwear industry, which will produce high quality and make it possible to release workers. It is time to become independent of foreign deliveries of equipment. It is no accident that at the June conference in 1985 of the CPSU Central Committee concerning the acceleration of scientific and technical progress, M. S. Gorbachev raised the question of having all machine-building branches help in the output of equipment for light industry. It is also necessary to solve the problem of providing personnel, which is becoming more and more crucial.

[Editorial comment] New items are lying around in Petr Zakharovich's office. At first glance everything is surprisingly attractive and smart. The summer footwear is especially good. But when you begin to look at each pair you are immediately struck by the difference. Some are light, almost weightless ("They are imported, with a molded sole," explains Litvinchuk). Others have designs that are no less original but they are heavier ("The sole is made of fine porous rubber called 'malysh'," the director comments. "True, in recent years we have been receiving 'depora' light rubber, it is nicer looking and lighter than the other materials in the bottom parts of the shoes, but it is labor-intensive to process. If we had automated machines for molding soles the quality of summer footwear would improve and labor expenditures would decrease.")

When EKO was preparing an article about the Armenian Footwear Association Masis, even at that time the Yerevan workers had raised the question of automated molding machines for manufacturing the bottom parts of shoes. Almost 4 years have passed, but the country's footwear workers are still not supplied with molding equipment.

[Question] Yours is an experimental factory. How is your experience in the production of new items disseminated to other enterprises?

[Answer] Our goal is to try out not only new designs, but also new materials, kinds of trimmings, technological processes, and equipment. Representatives of other enterprises are always coming to us to learn about our technology and organization of production. In the factory we held an all-union school-seminar on advanced

methods of producing children's footwear. But concerning the system for bringing innovations into the production of children's footwear, they could tell you about this better in the republic House of Designs and the republic Ministry of Light Industry.

[Editorial comment] Unfortunately, we did not receive a satisfactory answer either in the ministry or in the House of Designs. The dissemination of experience is impeded by the different levels of technical supply of the enterprises and the specific features in the technology and organization of production—this is what they tell us there.

Practice shows that this is not the only case in which experimental enterprises are not used for the purpose for which they were created—to bring everything new into the branch. Taking into account the specific features of production, it will undoubtedly be necessary to make certain changes in the technology and organization of series production enterprises, but the valuable experience that has appeared in the process of experimental testing of the design could turn out to be extremely useful to many enterprises. For the experimental factory of the branch they should centrally create nonstandard equipment and adaptations which, after testing, could be reproduced for other factories.

[Question] The nature of your production and your product requires highly skilled personnel. How do you manage to solve this problem?

[Answer] The collective at the factory is youthful. Of the 1,420 industrial production personnel, there are 780 Komsomol members, that is, more than half. When in 1977 we moved to the new building in which we are now working, the production was tripled. Moreover, many older female workers were released since they felt that this was too far to go to work. Previously the factory huddled in adapted premises of an old monastery (now it has been restored and by the 160th anniversary of the Decembrist uprising they created a new museum there. In 1826 within the walls of the monastery, they did the first interrogation of Decembrists of the Chernigov regiment, Muravyev-Apostol, Bestuzhev-Ryumin, and others). It is located in the very center of the city, almost on the bank of the Dnepr. Traveling to the new factory in the distant microrayon seemed too much for many female workers who lived near the old premises.

It was practically necessary to create the collective anew. We experienced some fairly difficult years. For the first time, labor turnover reached 35 percent. We lost all hope that anyone would come and apply to work here. In the city there were quite a few new enterprises that were just as interested as we were in an influx of personnel. Therefore we decided to train the personnel ourselves. We organized at the factory a branch of the vocational and technical school of light industry and placed an entire floor of the building at its disposal.

Thus from the moment the boys and girls arrive at the school they know where they will be working under the new conditions and what work they will do. They do their first practical work at the factory and then on-the-job training in their workplace. In each shop they have introduced positions of masters of production training. The shop chiefs are in attendance at the examinations. And nonetheless even now not everything is going smoothly. A considerable proportion of the young workers do not work at the factory after graduating from the PTU. The fact is that we do not have effective measures for legal influence on the graduates of the system of vocational and technical education, taking into account the passes that are issued to them for work.

We need more effective measures, including material responsibility of PTU graduates for failure to appear at work within the established time periods. This is required by the times and is a necessary condition for further strengthening labor discipline in all branches of the national economy. We have turned to the State Committee for Vocational and Technical Education twice regarding this issue, but we have gained nothing except bureaucratic formal replies. And the Goskomtrud should not stand on the sidelines either.

For our part, we must strengthen the occupational orientation and occupational selection, and reinforce the educators and masters, taking workers from the factory. The problem of the pedagogical personnel of the PTU is a common one for all schools of the country and it is linked to wages. The wages of a GPTU master are less than in production, and his duties are just as complicated.

Priority is also given to youth in solving social problems at the enterprise. Through their own efforts they constructed a sports complex, two children's combines to accommodate 140 each, and they almost completely satisfied the need for children's institutions. They constructed a nine-story dormitory to accommodate 414. We are constructing a building for young families with one-room and two-room apartments. Several of our workers have enlisted in the youth housing construction cooperative organized by the gorkom of the Komsomol. But even all that has been done still does not fully solve the housing problem. If in 1988 we manage to begin construction on the 140-apartment residential building, as is earmarked in the plan for socioeconomic development for the 12th Five-Year Plan, by the end of the five-year plan, the factory's collective will basically be provided with housing.

We have our own hothouses and greenhouses. In the new production facilities that are now being constructed and will be introduced in 1988 (we will be annually producing 500,000 pair of infants' shoes there, which at the present time is the group of children's shoes that were in shortest supply), and we shall open a store, a barbershop, and shops for repairing footwear and rendering certain other consumer services.

The new management conditions have played a certain role in retaining personnel. It is of great significance that the enterprises have been given the right to give incentives for mastery and qualifications. Increments to wages are now being received by more than 420 workers and 74 engineering and technical personnel and employees. According to the wage rate and qualifications guide, in the shop for partly finished products there are low categories, no higher than a third. Yet the labor there is not easy—a person pounds on leather for 8 hours there. Since wage increments were permitted for professional mastery of workers of categories 4-6, we could not provide incentives for skilled labor of workers in the shop with half-finished products. But as soon as the increment was extended to the third category, the managers had a good lever for incentives in their hand.

Work at the enterprise is mainly in brigades: 80 percent of the workers are included in brigades. These are primarily the technological flowlines for footwear production. But in the auxiliary and service production they have created brigades that are made directly dependent on the results of the work of the main production. The service problem has thus been solved. For example, at the factory a brigade of loaders consists of only three people and we now have no problems with loading and unloading operations, since payment for expanding the zone of service lets us perform the work with fewer personnel.

Now the brigades are not only interested in seeing that the number does not exceed the plant number. They are trying to place personnel correctly and release people with inadequate loads. Bonus payments in addition to the wage rate are distributed by the brigades themselves on the basis of the coefficient of labor participation.

All the measures that were taken made it possible under the 11th Five-Year Plan to sharply reduce labor turnover. Now it is at the level of 14.5 percent, but this is still high and therefore there is a good deal of work to do in the future. Labor productivity has increased significantly. With the five-year plan for 18.7 percent, its increase amounted to 30.5 percent. The entire increase in output was achieved as a result of increasing labor productivity. The increase in volumes amounted to 25.6 percent as compared to 14.7 percent in the five-year assignment.

[Question] How do the new management conditions contribute to improving the quality of the products that are produced?

[Answer] You know, strange as it may seem, it is difficult to answer this question. At first there were the Emblem of Quality and the Index "N" (Innovation). Then light industry rejected the Emblem of Quality; it is earned in 2 years and light industry products, essentially, are used for up to 1 year, especially footwear, and sometimes only one season. True, it seemed to me that we should have rejected the "N" and have kept the Emblem of Quality,

having improved it and reduced the time taken by the procedure for certification, and combining in one indicator all the economic levers inherent in both of them.

During the course of the economic experiment, the rights were expanded and the responsibility of the enterprises was increased to a considerable degree. We were permitted, at the discretion of the artistic and scientific-technical councils of the factory, to confer the Index "N" on new items if they met the established requirements for innovation and the level of quality, and we could set our own prices with a 10 percent increment for "N" but no more than allowed by the existing level of profitability. This was less advantageous than obtaining the index "N" according to the usual conditions, which made it possible to have a 15 percent increment to the retail price. But, frankly, we have never tried to increase prices, remembering that we produce children's footwear. Most of our increments are in the amount of 5 percent of the retail price. Because of the right to confer the Index "N" directly at the enterprise we have been given the opportunity to accelerate the delivery of footwear to production. Even with small percentages of increments for the Index "N" in 1984 we were able as a result of this to deduct an additional 84,000 rubles into the material incentive fund. In May 1985 they officially limited the amount of the increments for the Index "N" to 5 percent, and since August of that year that index has not been applied to children's footwear. Thus children's footwear enterprises are completely deprived of incentives for high-quality products and for updating the assortment.

[Question] And the plan for producing footwear by grade of quality?

[Answer] Only this. It is important to stay within the limits of the planned grade of quality, but there should be no additional incentives for updating the assortment or improving product quality. When the plan for the quality of footwear is not fulfilled, the brigade is deprived of some of its bonus increments to wages and the bonus is reduced for those who have not kept within the limits of returns. The coefficient of labor participation is reduced. Thus certain sanctions against reducing quality are in effect, but there are no incentives for improving it.

It seems to me that it is quite wrong to completely reject the special indicator of product quality in the children's footwear. We have made suggestions about how to evaluate the quality of children's footwear because one cannot completely do without this criterion for evaluation. For children's footwear includes the very wide range of sizes, from 10 through 37, which comprises about 50 percent of all the footwear produced in the country. Can one really refrain completely from evaluating the quality of such a large volume of footwear? It is

necessary either to introduce a point system for quality or to restore the Index "N," but we must differentiate the amount of the increment for it, depending on the cost of the footwear.

True, after abolishing the Index "N" for children's footwear, the USSR State Committee for Prices issued an instruction on the basis of which the ministries and departments can use the material incentive fund formed in the branch to stimulate the output of high-quality goods for children through deductions from the funds for bonuses for other enterprises for producing men's and women's footwear with improved quality. But for what is this paid? It is necessary to have criteria of quality. We should not decide how much to pay and whom to pay by the method of voting. Nobody needs this kind of bonus. And then in general it is a paradox—to give incentives to some at the expense of others! Somebody is producing high-quality men's and women's footwear, and at their expense we will be providing incentives for enterprises that manufacture children's footwear.

Enterprises specializing in children's footwear have ended up in the worst position in this respect. But who can say that specialization is a bad thing and should be rejected? In our country we do not have very many factories that specialize in children's footwear. There is a great shortage of products from our assortment.

[Question] Might the abolishing of incentives for the quality of children's footwear be reflected in its production?

[Answer] I do not think so. Even though factories that do not specialize in children's footwear, but only sew it on individual flow lines are not reducing their output. The fact is that children's footwear is on the product list of the USSR Gosplan and they are held strictly responsible for interrupting the output of it. Moreover, there is an incentive measure for increasing the output of children's footwear. For each percentage point of increase in volumes of children's footwear that is produced, 3 percent is deducted into the material incentive fund. There is the question of whether or not this footwear will please the consumers or remain on the shelves the warehouses and stores. It seems to me that without objective criteria for evaluating the quality, it will be more difficult to satisfy the demand, since the currently existing mechanism of management is aimed only toward increasing quantity.

Incentives for quality enabled us to provide for the planned level of profitability and increased economic incentive funds. But even in the second half of 1985, as soon as the increment for the Index "N" for children's footwear was abolished, deductions into the economic incentive fund decreased and profitability dropped.

[Question] Even though your enterprise specializes completely in children's footwear, it is still profitable while other factories assert that they sew children's footwear at a loss. What is the level of profitability?

[Answer] Increasing the volumes of production, improving the skills of the workers, increasing labor productivity and increasing the output of footwear with the Index "N" made it possible in 1985 to produce 1,793,000 pair of shoes while the plan was for 1,750,000 pair, and more than 90 percent of them had the Index "N." The profitability was 11.1 percent. After abolishing the Index "N" profitability dropped to 7 percent. The calculated profitability for 1986 is 7.7 percent with respect to the complete production cost. But this will not provide us with conditions for forming the planned economic incentive funds and will not enable us to take full advantage of those privileges which are granted according to the agreement of the CPSU Central Committee and the USSR Council of Ministers for Light Industry. As we know, the branch has introduced payment for length of service and the application on the flow lines and conveyor lines of rates both for heavy work and work under harmful conditions. But all these payments can be made only from our own funds. We cannot expect anything from the branch. Each enterprise must earn its own money for benefits and incentives.

Of course we are not sitting with our hands folded. We are developing a plan of measures which will make it possible to increase labor productivity as a result of mechanization and automation of production, expansion of the application of the Shchekino Method, and brigade organization of labor. But the system of indicators should also be improved.

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### Difficulties of New Enterprises

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[Article by Yu. V. Trusov, general director of the Sinyavinskoye Poultry Association imeni 60-Letiye SSSR (Leningrad): "When Do Newborn Enterprises Learn To Walk?"]

[Text] New enterprises experience serious difficulties both during the period of their construction and during assimilation. This means that something is not right in the large birthing home which brings them into the world.

### How It Was With Us

Our association, of course, is far from the giants of industry. As they say, "the smokestacks are not as high and the smoke is not as thick." But in the agroindustrial complex of Leningrad Oblast, this construction project was the largest in all the history of the construction of

agricultural enterprises, in terms of the volume of capital investments in the production zone and the social sector (85 million rubles) and in terms of their assimilation, and also in terms of the uniqueness of the objects that were erected (these were 15 10-story buildings which housed 1.5 million laying hens and up to 1 million chickens).

The construction was started in the spring of 1976. In December 1981 the state commission signed the document for acceptance of the last section, and in November 1982 the association reached its planned daily volume of egg production. In 1985 the planned indicators were fulfilled for the productivity of poultry and the volume of production and sales of eggs and poultry meat. During the last 3 years of the construction (1979-1981) through existing production we delivered to the state more than 200 million eggs and 2,500 tons of meat. While in 1979 the production was operated at a loss, during 1980-1981 the profit amounted to 2 million rubles. Along with the production, the residential village grew and developed, and now 5,000 residents live there.

It is my conviction that the exceptionally large amount of attention paid to the construction sites by the Leningrad CPSU Obkom played a fundamental role in the successful construction and assimilation of new production. A coordinating council was created which included secretaries of CPSU raykoms and gorkoms. It met no less than once a semester and considered the principal problems in the organization of the construction and the interaction of all participants and also the suppliers of equipment.

Even during the course of the construction the client and the contractor made changes approved by the coordinating council in the plan for the assimilation of production, which resulted in the acceleration of the startup of facilities for engineering and energy support and the technology for the assimilation of the new production became better proportioned, if one may put it that way.

It would seem that all is well. Indeed, the organizational side of the construction looked fairly good here. But I was left with a feeling of dissatisfaction. Apparently this was because all the measures taken during the course of the construction and assimilation were like therapy for some congenital disease of all enterprises and not elimination of the factors that cause it. And yet we have become so used to this that we cannot imagine a more or less large construction project in any other way. There must be a mountain of problems and a mass of difficulties and uncoordinated issues.

Each construction project is a kind of "Bermuda triangle" whose angles are the planner, the client, and the contractor. This triangle, with the active participation of higher departments, the Stroybank, the Gosbank, the Gosstab, and the Gosstroy, and other less "outstanding" organizations, can reproduce similar triangles and little triangles, and also complete polyangles in which, as in



the famous "Bermuda" triangle there is a disappearance without a trace of good ideas and proposals, plans, finances, equipment and the most costly thing—human labor expended in the form of incomplete construction or frozen capital investments. Only at those construction projects were the interests (sometimes directly opposing ones) of all participants in the construction and their higher departments managed to lead to a common denominator and be joined together in labor is success achieved.

So far this kind of combination is within the power only of party agencies that have an overview on problems and have such a powerful lever of influence on any organization as party discipline. I don't think that my conclusions are original, and many managers say: "How else? That is the way it should be!"

But why, actually? After all, every modern large (or not so large) construction project is planned first of all, and therefore it should be completely coordinated with the available materials, equipment, and labor and other resources. Where do we get all these difficult problems that appear even at the beginning of construction and are multiplied during the course of it—alas!—and do not disappear even after its completion and the release of the enterprise for operation, but assume a new quality, with which for a long time they impede the assimilation of the simplest capacities and normal operation of the new enterprise? Work experience in the assimilation of the three poultry enterprises enabled me to come to certain conclusions.

### Let Us Begin With the Beginning

The birth of any enterprise begins with the plan, and all (or almost all) of its future vices are included already in this stage. The first reason for the appearance of future problems in the construction and assimilation of a new enterprise is the simplistic approach to gathering initial data and calculations of the provision of resources. During the course of the construction of new productions I have frequently had occasion in searching for reasons for today's difficulties to look into tomorrow. There are difficulties with the delivery of feeds: either there is nothing to ship or there is nothing to ship it in. But in the initial data for the planning there is a reference with signatures and stamps to the effect that the enterprise would be provided with feeds of the necessary quality from such and such a mixed feed plant and the deliveries would be carried out by centralized automotive transportation, although in practice the plant does not manage to produce the necessary quantity of mixed feeds of the appropriate quality and there is no centralized automotive transportation in the region....

A large quantity of dung has accumulated in the dung storage facilities and there is the threat of polluting the environment. Ask the planners about this. And in response they will refer to the fact that the dung is shipped onto the fields of the sovkhoses. And this also

has a signature and a stamp. But how is this done when the roads are bad and it is impossible to get to any fields? And what is used for transportation if the plan for the base does not envision tractors? In response to many other questions that arise at each enterprise during the period of startup and assimilation you will find the corresponding references to the effect that these issues do not exist. Which is certified by a signature and a seal. Just so long as the planning is not held up. The technical and economic indicators of the future enterprise are arranged so that they passed numerous expert evaluations. The equipment, for example, is only that which is series-produced. A large enterprise is in the planning stage for from 3 to 6 and even more years. It also takes up to 5 years and more to construct it. As a result, we, in particular, in 1981 received an enterprise that was equipped with equipment which was progressive in 1968 but had ceased to be so in 1973 and was removed from series production.

In planning they usually do not sufficiently take into account the requirements for organization or the technological nature of construction (because there is no general contractor yet) and, as a rule, in our branch we have not yet completely developed the problems of the organization of production at the future enterprise and the management of it. The calculations and tables in the plans are simply a matter of form or a direct drive for a result that provides for passing the expert evaluations. One asks, but what about the client? But who is he? In our branch, the client at the moment is the higher organization (the Ptitseprom Trust). But can the higher organization fulfill the functions of the client intelligently and conscientiously? I daresay they cannot. And it is not that the specific workers of the higher economic organizations are unqualified or unconscious in performing the functions of the client (although this sometimes happens). In my opinion, they cannot fulfill these functions as is required. This follows from the distribution of priorities in the activity of any trust, administration, or main board which provides economic leaderships of the activity of enterprises under their jurisdiction and the actual level of qualifications of their personnel.

Among the tasks carried out by such a management agency a prominent position is held by the fulfillment of the plan for the production and sale of products. The best management personnel are engaged in this and it is precisely to this task that they devote if not all, then most of their working time. People tell me that planning and construction is also a part of the state plan. Correct. In order to fulfill these functions in the trusts and administrations, divisions for capital construction are being created. They are mainly staffed with engineers and construction technicians who have recently completed the institute who, as a rule, do not have sufficient experience in practical work and do not have sufficient knowledge (or no knowledge at all) of existing production and its requirements for the plans and the constructed facilities. It would seem that this is not essential:



after all, in the trust there are also technologists and engineer mechanics, and energy engineers. But construction affairs are not their main function and frequently they do not have the time or desire to engage in them. And the builders do not like to allow operation workers in construction and planning affairs since they "raise so many questions that the planning and construction will never end." Thus even in the stage of planning, specialists who are familiar with production are kept out of direct participation in the creation of a new enterprise.

### What Next?

Finally, the plan is approved and the construction is included in the plan. It would seem that if not before then now it is necessary to create the board of directors of the future enterprise. But no! Boards of directors are being created for enterprises of the construction in which all the leading positions, beginning with the director, are held by specialists who are very familiar with construction, financing and other problems related to it, but not with how this enterprise should operate. As a rule, the specialists on the new board of directors have transferred from old boards of directors that have been disbanded because of the completion of construction. The majority of these are talented and energetic people, but...in their own area. And what is their area or, more precisely, their task? Each year to assimilate the capital investments that have been allotted and complete the construction on time. But whose task is it to organize the work of the future enterprise? Again, nobody's. Because the people who will have to work at this enterprise have not been chosen yet. But anyway, when will there be that insistent need to create the board of directors for operations, when it is no longer possible to ignore this? In two cases: if the release of the completed enterprise is approaching or if the plan for the production of products established for the trust or the administration cannot be fulfilled at existing enterprises and requires that the production capacities at the enterprise under construction be introduced ahead of schedule. The latter case is more widespread. But even in this situation the board of directors of the construction project is the leading one and for the assimilation they hastily send personnel from other enterprises who have extremely limited authority. As a rule, the assimilation begins when there is no engineering base at all, when there is a personnel shortage, and also when there are other difficulties that are well-known to everyone who has had to assimilate an enterprise that is under construction. Finally, on the basis of facilities that are being put into operation, the existing enterprise is created and the director is appointed.

It is a most complicated situation. Brigades are sent from other enterprises to assist and for a certain period of time they managed to cope with the difficulties, but then the brigades leave, there is no base, there are not enough personnel or technical equipment—and everything starts all over again. Not every director and not every head

specialist can handle this and therefore the management personnel change. And this is the way it is throughout the entire period of the completion of construction and for a long time afterward.

A new enterprise requires help; first it is refused and then it is given. And there is much that needs to be done: construct shops, garages, and warehouses not envisioned by the plan, gather and train personnel, equip the enterprise with necessary technical equipment that was not envisioned by the plan, work out the organizational-production structure and the structure for management of the enterprise and the guidelines and normative-technical documents, correct the planning shortcomings and eliminate construction shortcomings or defects that have been revealed....

The fact that the enterprise reaches its planned capacity certainly does not mean that all the difficulties are behind it. Its activity frequently depends on the existence of reserves in the plan. Just take our association. When planning the first poultry farms which were constructed from 1966 through 1969 and were equipped with KBN batteries of cages it was based on putting five hands in each cage of the battery while the production workers began to put six in. The plans for poultry factories constructed in 1970-1975 included a norm of putting six hands in a cage but in production they began to include seven. The plan for our association was based on a norm of seven hands, but—a last explanation point—they will not hold eight....

And what is meant by the very fact that it has reached its planned capacity? Only that the enterprise can annually produce the quantity of products envisioned in the plan, but is it capable of producing this quantity of products regularly every year? Very frequently reaching the planned capacity when achieved at any price at the same time produces a negative answer to this question. As a rule, the period necessary for fulfillment of all the measures that provide for the possibility of stable operation of the enterprise in the plant (or higher) parameters significant exceeds the time for the release of the enterprise until it reaches its planned capacity. This has become especially noticeable now because of the course taken by the party toward intensification and all around increased effectiveness of production and product quality and savings on fuel and energy resources.

### Is a New Enterprise Effective?

An analysis of enterprises that have been constructed shows that in terms of product quality, production effectiveness, scientific organization of labor and management, labor safety, maintenance of socialist property, ecological safety, economy of fuel and energy resources, and waste-free technology, they do not always meet modern requirements or they do not meet them at all. This happens also because the currently existing normative and technical documents that are used to determine the volume of requirements for the plan do not fully

provide for correspondence between the products that are produced and the requirements of the standards and other normative-technical documentation for these products, the organization and safety of labor, protection of the environment, and so forth.

They include many good wishes and even more limitations of various kinds that impede the realization of these wishes. During the course of planning one finds mainly limitations: therefore little is left of the good wishes. Therefore also enterprises are born which are limited by their level of technical equipment and technology, financial and other criteria, and also the level of our understanding and our attitude toward a given specific branch which lags behind the present level by the time period that is equal to the duration of the planning and construction. And the requirements for an enterprise that is in existence always correspond to the present day, for it can be no other way. This is an objective process which cannot be held back, not to mention ignored if we do not want to get hopelessly behind and recede into the past. This disparity is included even in the stage of planning, but subsequent shortcomings in the organization of construction and assimilation increase it. Even if we manage to avoid exacerbation of the planned disparity as a result of better organization of construction and assimilation of new production, as a rule, we cannot completely eliminate it during the course of construction.

### Who Is Responsible for the Final Result?

In the planning, construction, and assimilation of new enterprises we have an artificially separated responsibility for the final result: an enterprise that is operating stably, meeting the level of scientific and technical progress and the requirements for organization and safety of labor, economy, waste-free technology, and protection of the environment, and providing for the output of the planned volumes of high-quality products. This responsibility is divided between the planners, builders, and directors of the enterprise that is under construction and the one that is in operation. One could object that the last link in this chain of responsibility—the directors of the enterprise in operation—is in the most responsible position. I agree. And this is precisely why its representatives are removed from their posts during the period of assimilation. For it is possible to bear complete responsibility for the fulfillment of duties only when they have the necessary conditions for this and the corresponding rights.

What can be suggested as alternatives to the existing policy? As soon as the subject came around to responsibility for the final result, it was necessary first of all to change the criteria for the responsibility of planners and builders. They along with the directors of the enterprise in operation should be responsible for a new enterprise's achieving the planned technical and economic indicators within the normative time periods. The responsibility should be primarily economic, and, in my opinion, this

would not be so difficult. It would be enough to have the currently established bonuses for the output of a plan and for the startup of a facility be replaced completely (or partially) with a bonus for the enterprise's reaching the planned technical and economic indicators within the normative time period. A bonus should be given for this in the stage of assimilation by the collective of the enterprise in operation and the corresponding workers of the higher organization.

But this is not all. It is necessary immediately, as soon as the decision is made for the construction of new enterprise, to create its board of directors (or at least appoint the director) and transfer all the functions of the client for planning and construction. So far this is impossible because of financial and other restrictions. The directors should have all the necessary rights for influencing the planning and construction, right down to the right, in conjunction with the planning institute and the authorized organizations, to determine progressive technology and the equipment necessary for implementing it, taking into account the time periods for planning and construction.

### There Is a Board of Directors. But Does It Decide Everything?

It is also necessary to change the principles for determining the cost and defending the plan. In our branch now, for example, in the stage of expert evaluation of the plans, decisive significance is attached to the total cost per chicken, per animal, and a number of other indicators which not only do not contribute but, on the contrary, impede the creation of effectively operating enterprises. On behalf of achieving the normative cost of a chicken accommodation, as a rule, they reduce the number or area of auxiliary, subsidiary, and warehouse facilities, and cut back the facilities for engineering and energy support, environmental protection, the thickness of the road paving, and so forth. Thus the volume of capital investments is reduced. But then the enterprise, if it wants to operate stably, still has to complete the construction. I am not in favor of increasing the cost of construction but I am in favor of having it be realistic and correspond to the real needs for creating an effectively operating production. To do this it is necessary, it seems to me, to develop normatives of capital investments per unit of future output. This is possibly not acceptable everywhere, but in our branch it is completely acceptable. The normatives should be territorially differentiated and then the cost of the future enterprise will be determined immediately as soon as it is established, how many and what kinds of products it is to produce. The board of directors should also have this sum available when they order the plan and the planning institute should use this figure alone with the client.

It is necessary to refrain from a policy where first the plan is completely ready, then it is approved, and only after that does construction begin. We lost time in this abyss even when we divide the planning into sections. It

is necessary to determine the general plan for the enterprise, the overall technology, the set of facilities and their cost, and immediately begin planning facilities for engineering and energy support, and as they are ready the directors, within the limits of their authority, approve them and turn them over to the general contractor, and he immediately begins construction.

During the course of construction the directors, in conjunction with the planners and builders, should be given the right to make substantiated changes to the planning documentation on the spot, without increasing the cost of production or prolonging its time periods. This way it would be possible to operationally take into account both the achievements of scientific and technical progress and to correct the shortcomings and inconsistencies in the plan as they are revealed. Along with the beginning of planning it is necessary to begin the development of systems for the organization of labor and the structure of management and as they are completed—the training of personnel in the labor professions and the management staff at the leading base and related enterprises, institutes, vocational and technical schools, and so forth. If the enterprise is being constructed outside of population points with its own housing supply, it is necessary to begin the construction of the housing supply and other facilities of the social sector simultaneously with the construction of the enterprise and to carry it out at more rapid rates. It will be possible to form the collective which will initially be used in the construction of the corresponding facilities and as they are ready will be transferred to start up at adjustment work and permanent operation.

The interaction of the planners, builders and client is determined jointly by the combined schedule developed and approved by the corresponding higher organizations for issuing planning documentation, beginning and completing the construction of facilities, delivering equipment, releasing facilities for startup and adjustment work, releasing them to the work commission and, finally, to the state commission. As the facilities are received by the work commission the directors immediately begin their operation. The schedule should provide for the startup of an enterprise in keeping with the planned technology and should reach its planned capacity within the time periods set.

It would not be a bad idea to have the relations of the directors, planners and builders arranged on principles of interaction of all-encompassing brigades that produce products that are processed sequentially in various sections. Apparently the time has come to create unified all-encompassing standards that determine the coordinated volume of requirements in all stages of the creation of the new enterprise. A major role in this interconnected chain of normative and technical documentation should be played by the standard (or other document) that establishes the requirements for the quality of products that are produced, organization and safety of labor, protection of the environment,

economy and other factors that determine the level of work of the operating enterprise. The failure of the plan to meet these requirements is determined by the board of experts. The level of the expert evaluation depends on the cost of the facility. In any case a preliminary conclusion is prepared by the directors and it, in conjunction with the planning institute, defends the plan in the expert evaluation.

After the defense and approval of the plan, nobody else except the directors should intervene in its realization, including the Gosbank which, when considering the documentation, always finds "excesses" and eliminates "unjustified" expenditures. And again the width and breadth of the highway pavements are reduced, the class is lowered (and, correspondingly, the quality as well) of finishings, until the necessary sum of "savings" is gathered.

### **The Enterprise Is Constructed. Is This the End of the Problems?**

All that has been written above pertains to the construction of new enterprises. But it applies equally to reconstruction and technical reequipment of existing enterprises. Here there are several factors that significantly complicate the reconstruction and technical reequipment of existing enterprises as compared to new construction.

First. Existing enterprises are producing products, and reconstruction or technical reequipment of even one production facility rules out for a certain period the corresponding production capacities, which leads to a reduction of the volumes of production of products. Under our conditions it is difficult, if not impossible, to achieve a reduction of the plan (compared to the level reached) for the period of reconstruction. But what about if there is a need to halt the entire enterprise for reconstruction or technical reequipment?

Second. All work for reconstruction and technical reequipment is done under the conditions of existing production, which complicates the work both of the planners and the builders and, to an even greater degree, of the client. The slightest lack of coordination in the actions or a violation of the time periods can lead to the most serious consequences.

Third. Most enterprises have been built according to plans that absolutely do not envision the possibility of reconstruction or technical reequipment of the production and that which is produced to replace it has different sizes or different principles of interaction and is not included in the existing assignments. All this causes great difficulties and increases the cost of reconstruction.

It is possible and necessary to avoid or at least to reduce significantly the negative influence of these three factors even in the stage of planning the new enterprise. To do this the plan for each new enterprise should contain a

section entitled "reconstruction and technical reequipment, in which, based on the length of operation of the installed equipment, they should develop questions of the time periods and sequence for conducting reconstruction, technical reequipment and organization of the work. Then the plan for the enterprise itself and the policy for putting the facilities into operation should correspond to a certain cycle that makes it possible to shut down certain facilities of the enterprise as the equipment were operated for the established norms of duration of operation so that it can be reconstructed (or technically reequipped) without reducing production volumes.

For example, in the next 3 years all of our technological equipment will be completely amortized and we will be faced with the problem of operating not only obsolete but also worn-out equipment with all the negative consequences that ensue. The association produces 366 million eggs and 3,300 tons of poultry meat a year. To shut down even one section for technical reequipment will lead to a reduction of the production volume. What should we do? We have now been forced to construct reserve capacities for rearing and production and this will take 2-3 years. Technical reequipment will have to be started after that. And how long will this last if in a year we can reequip only one section of the production? Nine years. So far we have reached the second section and equipment for it is being operated for twice the normative length of operation. And the equipment was obsolete even before 1980 and was removed from production long ago! My colleagues can imagine what this costs our association.

What is the answer? I shall continue the idea expressed above. Every enterprise that is anything like ours from the moment of completion of construction should for a certain period of time change over to a stable cycle of technical reequipment which is the same for each facility included in the enterprise as the normative time period for the duration of the operation of the equipment established in it. And in order to change over to this cycle one part of these facilities should be shut down for technical reequipment ahead of time (especially if the installed equipment is obsolete), another—at the end of this time period, and a third—after the normative time period for operation. On the average for the enterprise they should maintain the normative time periods of the operation of equipment. In places where technical reequipment can be carried out in sections within the facility without shutting down operation of the entire facility, the principles should be the same. Then it is possible to count on the period and volume of technical reconstruction and be assured that in each facility the equipment will be replaced with more progressive equipment immediately upon the expiration of the established time period for its operation, and all facilities will be shut down for technical reequipment or reconstruction rhythmically, without disturbing the production program. This cycle should be taken into account when determining the annual volumes of production in the five-year plans for economic and social development.

Only then will reconstruction and technical reequipment become an indispensable part of the production program and the technical renewal of enterprises will change from a campaign that is difficult to begin and carry out into a constant production factor, and it will be a stable function of the management and production staff. At the same time it is necessary to categorically put a stop to any attempt to increase production volumes (or save the plan) by postponing the fulfillment of measures for reconstruction and technical reequipment.

I emphasize once again that this cycle should be calculated even in the stage of planning, taking into account in the plan, and approved by the corresponding authorities. Only then will all of our newborn enterprises be rid of congenital diseases and rapidly stand on their feet and make a stable maximum contribution to the implementation of the program for intensification of our economy.

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### Role of Quality Standards Examined

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[Article by N. P. Morozov (Moscow); the author worked for about 10 years as deputy chairman of the USSR Gosstandart and is now on pension. He is the author of the book "Ekonomicheskiye problemy standartizatsii" [Economic Problems of Standardization], Moscow, "Ekonomika" (1986): "On the Line of Demarcation—Standardization and the Technical and Economic Level of Products"]

[Text] This selection was compiled with the active participation of our readers. The editorial office receives information from design organizations and enterprises concerning the fact that standards do not always perform their main role—stimulating scientific and technical progress and product quality. Product certification is frequently turned into paperwork; the abundance of standards and the numerous permissions and signatures create a barrier on the path to creative research on the part of the developers of new technical equipment and technology as well as new items.

As was said in the materials of the 27th CPSU Congress, unless product quality is improved not a single socioeconomic or scientific-technical problem can be solved. Recently many decisions have been made so that even under the 12th Five-Year Plan it will be possible to make a decisive breakthrough in this important area.

The articles and letters give various viewpoints on the problem of the dependency of the quality of industrial products on standardization. It seems that every reader will find a viewpoint he can share. Not a single one of these positions can be reduced to a denial of the system of standardization in general or the system of product certification in particular. Their importance to the national economy is obvious. The essence consists in something else: how these instruments for control of scientific and technical progress are being used. They can be used to measure and evaluate a great deal or almost everything. But the bureaucratization of these methods, the formalism in their application, their slow improvement, and the position of Gosstandart organizations "over the enterprises" and not alongside them, as well as other negative aspects, for example the lack of cost accounting [khozraschet] relations in this matter, will undoubtedly work to the disadvantage of this cause.

The Basic Directions for the Economic and Social Development of the USSR during 1986-1990 and the Period Up to the Year 2000 are very clear about this: "To accelerate the revision of standards and technical specifications for products, orienting them toward the highest world achievements. To raise the level of work for certification of industrial products so as to provide for an objective evaluation of production quality. To develop standardization on the basis of future scientific and technical achievements and deepen branch and interbranch unification of machines, components and parts."

In order to achieve these goals it is necessary for Gosstandart agencies, ministries, and industrial associations and enterprises to work together.

In the world there are about a million standards of various ranks—international, state, national, republic, branch, firm, and also innumerable technical specifications. In capitalist countries standards are mainly recommendatory. In the USSR and other socialist countries standards are included in the system of the planned economy and are mandatory. Their application makes certain specialists hope for regulation of all industrial activity. Others, on the contrary, are skeptical: a certain conservatism of standards is considered to be incompatible with the rapidly changing conditions of modern production.

It is not easy to figure out the varied array of opinions. Life demands a new measure of things and a rethinking of many concepts, above all those related to product quality. High product quality is regarded throughout the world as a means of increasing the country's prestige, as a matter of national pride, as a way of winning markets and increasing the ability to compete, and as a mandatory condition for providing for the state's military potential and developing its economy.

We have started a large amount of work under the 9th Five-Year Plan and in subsequent years. The so-called system of control of product quality and work quality has been introduced into practice everywhere on a public basis. Economic agencies have exerted a great deal of effort to move forward. The Gosstandart has developed an entire complex of measures. The system of product certification is being introduced persistently and we have approved the "Basic Principles of the Unified System of State Control of Product Quality." Certification for the state Emblem of Quality has encompassed all the basic kinds of industrial products. It would seem that the mechanism for certification and control is operating effectively. But these ideas have turned out to be illusory. Many items that have received the Emblem of Quality, including newly assimilated ones, are clearly below the level of the best domestic and foreign models.

The current system of standardization includes more than 21,000 GOST's, about 54,000 branch standards and 7,000 technical standards as well as more than 135,000 technical specifications (TU). Each standard for specific kinds of products contains dozens or even hundreds of indicators and specifications the nonobservance of which is "punishable under the law." But the main principle—"the establishment and application of rules in order to regulate activity in a particular area to the advantage and with the participation of all interested parties..."—in reality means reaching a compromise between the demands and the possibilities (between the consumer and the manufacturer). This makes it necessary to have lengthy, multilevel, and not very effective negotiations.

Establishing the technical level of products reminds one of pulling a cable taut. The developers of standards (product manufacturers) pull in one direction and the consumers—in the other. The Gosstandart in the role of intermediary goes on the side that pulls harder, whose conclusions seem more convincing. In the majority of cases the manufacturer gets his way. As a result many standards for the level of indicators of product quality are not high enough. The priority of the interests of manufacturers is also manifested in the excessive increase in the number of indicators, right down to including in the standards descriptions of technological processes and specifications that are advantageous only to production. The abundance of indicators and requirements has made the system of standardization cumbersome and slow. All this has a negative effect on the responsibility of the manufacturers.

The problem of the correspondence of standards to the requirements of scientific and technical progress made itself known with special force under the conditions of the changeover to mainly intensive methods of management. The decisions of the 27th Party Congress set the task of providing in the next few years for the output of products that are as good as the best world models and accelerating the production of new technical equipment, materials and technologies.

The decree of the CPSU Central Committee and the USSR Council of Ministers, "On Measures for Radically Improving Product Quality" (1986) formulated the directive for improving standardization; it says that the Gosstandart must increase its demands on the ministries and the departments of the USSR for the preparation of normative-technical documentation, its practical utilization, and the objectiveness of the certification according to quality categories, and they must also take measures to improve and simplify the policy for formulating and coordinating technical documentation.

Increased demandingness for the preparation of normative-technical documentation means the establishment of truly socialist labor discipline. In standardization, as in any other activity, it is especially important to have demandingness and responsibility in the majority of operations and in general, and not merely for a small section ("from here to here") or for immediate assignments. It is necessary to evaluate the state of affairs critically, weigh the possibilities, arm oneself with methods suggested by advanced practice, and do away with office negotiations and compromises that make life peaceful for everyone but also allow the acceptance of products with low indicators.

Bringing order into norm setting in the cycle of "scientific research—planning—production—operation" involves solving problems of varying complexity in three classes: 1) optimization of parameters of existing technical systems; 2) reinforcement of design improvement in the norms; 3) the establishment of norms on the basis of newly created models developed using scientific discoveries and inventions. Principally new planning decisions and, consequently, the development of progressive norms, are directly related to the realization of the most complicated class of technical problems. It is here that one sees the "line of demarcation" between the ordinary norm that registers insignificant improvements, and the norm that corresponds to the latest achievements of technology and production.

The main efforts of standardizers are expended on "digging through" a large mass of outdated standards related to the finishing and modification of items that are in series production. Revising the norms and bringing them up to the average level takes 90-95 percent of the time. The norms are developed on the basis of a comparison with analogues and are put into effect 1.5-2 years after the establishment of the standards. In the majority of cases there are no direct analogues and the developer selects indicators that are advantageous to him, using data for items that have been assimilated in production 2-3 years ago. It sometimes happens that an entire 5-year period is not accounted for. The time lag causes obsolescence of these norms even before they are introduced. Even the best variants of the establishment of norms on a deliberately low basis do not produce stable guarantees that these norms will be actually progressive.

The indicators of the service life (6,000-8,000 hours) and expenditures of fuel and oil that are introduced into the standard for internal combustion engines impede the development of diesel construction. Thus the technical specifications of the newly developed YaMZ-8421 engine (expenditure of fuel, lubricants, and service life) of the Yaroslav Avtodizel Production Association not only fall below foreign analogues, but also below the modernized variant of the series-produced engine. And there is nowhere to go: two competing directions have come into conflict. Although the blocked modernization has turned out to be more effective, the YaMZ-8421 engine, which is worse with respect to many parameters, is the one being placed in series production.

**Many years of departmental red tape and ambitions cause harm to the country's economy. The indifferent attitude of the Gosstandart toward protecting state interests in this case is explained by its inability to get rid of the ingrained practice of establishing indicators at an extremely low level so they are always lagging behind events.**

An example from another branch. Metal cladding lubricants with additives created 30 years ago (dozens of dissertations about this new area were defended, there were about 200 inventions, and more than 400 works were published), which proved themselves at many enterprises of various branches of the national economy, are not being introduced into production. The Ministry of the Petrochemical Industry, in spite of the fact that the new lubricants increase the lifespan of friction components many times over, are sharply reducing labor expenditures in production and stubbornly refusing to produce these in a sufficient amount, referring to the "sufficiently broad assortment of high-quality lubricants." And in this case Gosstandart must clarify the definition of "high quality lubricants" and make the corresponding changes in the normative-technical documentation, having given priority to metal cladding lubricants with additives and thus crowding out obsolete products that were assimilated long ago and including them among the uncertified ones.

Evaluating the quality of all products of any particular kind and ranking them taking into account the consumer qualities open up new possibilities of standardization and certification of products so they can influence quality and the effectiveness of public production.

So far the current difficulties of a quantitative nature—the revision of a multitude of standards—are clouding the horizon. And the main thing is that the contradictory collisions that come about when it is necessary to deal with an innovation require the application of immense efforts. If one is to believe psychologists, solving a new problem takes 20 times more energy than an old one. And the new does not always end up the winner; sometimes it fades from the scene without overcoming the resistance of the old. The inclination in the direction of quantitative growth and simple repeating changes to the

detriment of qualitative leaps of transformations lead standardization away from the main directions in the development of scientific and technical progress.

Without eliminating the method of establishing norms from the result that has already been achieved, one should give preference to the strategy of selecting a technical solution at the level of inventions. We shall corroborate this with facts.

Engineers of the Gazstroy Mashina Special Design Bureau developed the MM-631 pipe layer whose moment of stability was twice as great as that of the old one. The new equipment was capable of raising and holding a cargo with a long boom. Because of these qualities it was possible to get by with only one machine instead of two of the conventional pipe layers. The high operational characteristics were achieved as a result of a principally new design solution—caterpillar movement in the spread variant. As the booms became longer and the tilting moment of the far caterpillar track increased, the machine, along with its basic mounted parts, can move in the direction opposite the boom. The United States, Canada, and Japan, which have a great deal of experience in creating this special cargo lifting equipment for the construction of gas lines, have purchased patents for the utilization of wide tracks in their designs.

Is it possible to register this outstanding achievement in normative-technical documentation and standards without waiting until series production has been started, until the plants are prepared for producing this equipment?

There is no simple answer. In theory it is possible and necessary. For the establishment, for example, of a technical norm for the ratio that has been achieved between the mass of the item and the mass of the cargo that is listed will make it necessary to reevaluate existing designs and make the designers introduce innovations that sharply reduce the metal-intensiveness. But according to existing practice, even in the best case, if it dawned on someone to develop a standard, this will take 2-3 years. Usually they are satisfied with the development of technical specifications (TU) only for the given model.

The experience of the Tallinn Punane Ret Plant is instructive. Here they have created the new Estoniya 010 stereo radio phonograph with a resolving power at a level of the best world models. As a result of the innovative approach the plant reached the level of quality plan for the ministry for 1990. The high class of the item was achieved as the result of a skillful combination of the old and the new, the utilization of improved parts, and the rapid development of new elements and parts at the level of inventions. Thus in 3 months they created a principally new engine which is better than the Japanese engine in terms of its technical level.

The division for new developments not only invents, but also turns over to the plant assembled units and items that have been patented and tested using technological

processes and technological fittings, and at the same time it turns over normative and technical documentation to production. This results in a colossal savings: the time periods and expenditures on the assimilation of new items are reduced by a factor of 5-10. Production cost and retail prices also decrease significantly.

Practice itself suggests how "to get off the trodden path," to get away from the established labor-intensive but not very effective procedure. The essence of the proposal amounts to combining numerous stages (the first edition of the plan, the second edition of the plan, the final edition, the consideration, the approval, the preparation for printing, and the introduction).

In the stage of state testing if the outcome is positive a decision is made to approve the new GOST's, OST's and TU's on the basis of which the new product was designed, manufactured and tested.

The Ministry of the Machine Tool and Tool Building Industry and the Gosstandart were among the first to approve the provisions concerning the head organization for state testing of diamond instruments with the right to submit for registration to Gosstandart agencies technical specifications and GOST's for diamond instruments without coordinating these with the consumers, associated workers, and trade agencies if the instrument has passed tests and meets modern requirements.

But the establishment of indicators and requirements for newly developed items that are recommended for series production in the majority of cases are carried out using technical specifications (TU). Standards account for less essential characteristics of the more widely produced constituent parts (assembly units and parts).

One of the important methodological directions in standardization is linked to the classification of tasks and their ranking. This is especially important at the present time, when the orbit of system analysis includes a large number of norms, normatives and specifications that pertain to complexly organized objects. It would seem that an efficient structure of normative-technical documentation that meets modern requirements would be a complex consisting of three groups of standards that are interconnected but differ in terms of their functional indicators: 1) the basic GOST's that establish the general principles, requirements, and norms; 2) GOST's that determine the list of indicators, the policy for norm setting, the general technical specifications and requirements, and methods of control and testing; 3) an operational branch complex: normative-technical documentation—standards and technical specifications for specific kinds of products.

A change in the structure as a result of increasing normative-technical documents of the operations complex (branch standards and especially technical specifications) corresponds to the objective need for a correct



combination of principles of centralization and decentralization. In addition to this, technical specifications do not have a statewide status, and in the majority of cases reflect departmental interests. Since technical specifications are documents of the first instance, which register the latest achievements of production, there is every reason to change the names to "state technical specifications" (GTU), assigning them the rank of state standards. This measure will increase the demandiness and responsibility for the development and approval of these documents.

The system approach is becoming the dominant one in solving many problems of scientific and technical progress. In standardization the system approach means changing over from individual items to technical systems and complexes of machines, which requires accounting more fully for technical, economic and social factors as well as a higher degree of development of the system of norms and normatives.

**Systematic ordering of the methodology of standardization means changing over to a new base for calculating the technical level—not from the minimum allowable, but from the upper technically possible and economically advantageous level, with an orientation toward the final result. When "old machines, instruments and apparatus are replaced by more effective ones and less expensive ones in comparison to the amounts of their work," (Footnote 1) a real possibility opens up for establishing truly high progressive norms and requirements.**

In this case the technical innovation reflects something radical, which fundamentally transforms the technical equipment itself as well as manufacturing methods, and is characterized, in the first place, by efficient utilization of materials and energy with respect to the function of the item, and minimum labor expenditures on manufacture. In the second place, it is characterized by high operational data and, in the third place, it participates directly in cost accounting relations and is evaluated according to the criterion of effectiveness.

The integrated indicator of product quality is calculated from the ratio between savings and total expenditures in the production and utilization of the product. The integrated norm is intended to express the total (integrated, system) quality and to take into account the structural, quantitative, qualitative and value factors. From this calculation one can see that the establishment of integrated norms and normatives is the prerogative of planning agencies. As concerns the interconnection between qualitative and value factors, its nature is still not well studied, as a result of which complicated and even paradoxical situations arise.

The objectiveness of the certification of products in the various quality categories depends on many factors. There is a struggle between sides: the purely technical characteristics of the product sometimes conceal the economic effectiveness of its application; management

workers are basically concerned about the destiny of the plan and strive for good quantitative indicators (output volume, proportion of products of the highest quality category in the overall volume) while not forgetting to increase prices, but the consumers can also figure out what is what and they draw their own conclusions.

The difficulty of achieving compatibility at one level of even two competing criteria (quantity and quality) can be metaphorically compared to a football game with two balls. Therefore the determination of the optimal values of the technical and economic level of products remains problematical. In order to find a balance, that is, a balanced ratio between quantity and quality, and also in order to determine the optimal level of product quality, it seems to us, one should apply integrated norms and normatives. **Attention should be given to the proposal to compare plans in "effective units," that is, physical units (tons, pieces) multiplied by quality indicators (service life, mileage on tires, wear and tear resistance of instruments, and so forth).**

The reliability and effectiveness of certification are reduced to a significant degree as a result of putting the product into the highest category without taking into account how innovative it is or its national economic significance and advantage.

Quality categories by definition must reflect not only the technical, but also the technical-economic level, and hence arises the unalterable rule of accounting for economic and social factors. On the other hand, a multitude of criteria and indicators (for example, there are about 90 for a tractor) complicates the relative evaluation of the product: the idea of the major thing seems to "erode." **Hence the conclusion concerning the concentration of attention on the basic criteria of effectiveness—social labor productivity, optimal product quality—seems quite justified.**

A complete disclosure of the possibilities that lie in principles of certification depends largely on eliminating the equalizing approach to various items. For example, in machine building a tractor and a bolt are placed in the same category. The achievement of high economic effectiveness of public production depends mainly on the volume and quality of the products that are going directly to the consumers, and not on the intermediate result. It seems possible without violating the established policy to award the State Emblem of Quality only to the most important final product—mainly new, competitive products that have undergone state testing.

On 1 January of this year 1,500 industrial enterprises introduced state acceptance of products and consumer goods. The task for the first stage is to achieve a radical change in the attitude toward quality and eliminate mass deviations. In the second stage, which is more difficult, it will be necessary to reach the heights of the world level in a planned way. The corresponding system of norm



setting, which contains concrete high indicators of quality and the technical and economic level of products taken from reliable sources—plans carried out at the level of inventions (for example, for a diesel engine—a service life of 10,000-12,000 hours and more, proportional expenditure of fuel—148 grams and less) should be given the status of a universal movement for improving quality. This will make it possible to raise reports to a higher base and to remain on the cutting edge of scientific and technical progress.

The orientation toward a high final result and keeping up with the consumer leads to the idea of individualization of quality characteristics of products (expansion of the assortment, individual indicators of reliability) and individualization of series production, whereby one provides for the manufacture of products in small batches using mass production methods.

Intensification for standardization means a modernization of the norms and structure of normative work and a radical restructuring of the methods for evaluating quality and reliability. In our opinion, the optimal time period for reliable operation of technical equipment should be calculated from the conditions for obtaining a high final result in production and during the operation of items as well as the insurance of stable, reliable and safe work for the entire established period of operation without repair.

#### FOOTNOTE

1. K. Marx and F. Engels, "Soch." [Works], Vol 23, p 401.

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#### Product Quality Related to Development

18200191k Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87 pp 145-146

[Article by G. N. Katsman (Leningrad): "The Quality of Development and the Quality of Workmanship"]

[Text] Fairly frequently the equipment we acquire or the items we buy that are adorned with the State Emblem of Quality break down without even making it through the established warranty period. What can be said here about long and trouble-free operation!

Product quality is a multifaceted concept. Let us look at it, as people say, at the distance "from the idea to the machine."

And so, the idea. In the majority of cases the idea is good, original, and frequently even brilliant, that is, at the very cutting edge of science and technology. The technical level is extremely high, the technical specifications are original and they sparkle with innovation. In general, the picture is favorable, the development can be patented, and it sometimes even happens that foreign firms purchase licenses. The technical level of the development is the first aspect of quality. It is what gives the item the right to be awarded the Emblem of Quality.

And then after that....

All incentive measures, both moral and material, are directed toward the quality of the development. We have been given the right to a pentagonal badge of honor and we decorate all the items with it. And we manufacturers are not bothered by the fact that among them there are really well-made items, but there are also some that are so-so, and certain ones with defects, sometimes obvious ones, but most frequently hidden ones which will appear soon in the process of operation.

Go into any warranty repair shop—they are filled with items with the Emblem of Quality. This means that something is not right with the way we confer the quality categories! Apparently the Emblem of Quality should be conferred not for the type of item, but for a specific model of an item individually. And this should be placed with a stamp on the papers or the label for the item and not typographically or on the item itself. It is necessary to subject each item to serious testing, and for items that claim to have the pentagonal badge of honor, these tests should be several times harder.

It is difficult, of course, to give radical formulas for all cases, but one thing is clear: it is necessary to seriously revise the existing methods and the existing policy for incentives and stimulation of quality.

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#### Restructuring Advocated for Standards System

18200191l Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87 pp 148-149

[Article by A. A. Derevoyedov, head designer of the SKTB of the Elektroizmeritel PO (Zhitomir): "Standards Should Help"]

[Text] I have been working for about 30 years in electric instrument building and, naturally, I have come up against standards. At the beginning of the 1960's, industrial workers perceived the more active work with standards as a large step in the struggle for product quality on

the basis of instructions that were mandatory for everyone. Initially this was the case. The standards disciplined the developers and the standardization services were given the opportunity to check on quality locally. Quality and observance of the requirements of the standards were synonymous. But gradually these concepts began to diverge and the standards became a goal in themselves. Here is an example.

Workers in electrical instrument building recall GOST 1845-59 fondly. At one time in order to develop technical specifications (TU) for a new instrument nothing was needed except the GOST. It contained all the necessary limits: the classes of precision, the limits of measurement, and so forth. Now in order to develop a TU for an instrument it is necessary to use GOST 22261-82 and...36 standards that are referred to in this standard. These 36 standards refer to dozens more standards. In brief, the good old GOST has been replaced by dozens of standards. And these give references to other GOST's and the points themselves are not quoted but simply mentioned. It takes several weeks just to find the specific requirements. And how are the consumers and the Gosstandart agencies supposed to verify the instrument with respect to all the points of the TU? Moreover, frequently in different standards the same requirements are presented differently. Sometimes they contradict one another.

The desire to include everything in standards reaches the absurd. Take the so-called self-tapping screw. In form, this is the ordinary wood screw. These screws differ in the form of the head and the end. And someone found it necessary for such a simple thing to publish six (!) standards. And each has its own collective of developers, number and so forth. And yet all these varieties of execution could have been given in a single table.

One gets the impression that someone somewhere, without especially thinking about why this was necessary, included the development of all these standards in the plan and carried out this task brilliantly. But they did not think about the fact that it is difficult to work with so many standards and time is wasted in vain. And nobody thought about the main thing: the GOST's are not needed in and of themselves; they are supposed to ensure quality.

And another important aspect. All standards are revised from time to time, and sometimes when this happens only the year of the revision is changed—the last two figures in the number of the GOST. But in all TU's it is necessary to introduce changes where the old standard has been abolished. And in so doing it is necessary to go through all stages of coordinations and approvals. The manufacturer must hurry, since the control staff is threatening to halt production: "You are referring to a nonexistent GOST." The only way out is to immediately send a "pusher" to the instances in charge of approval. This requires so much nervous energy and so much shrewdness!

In my opinion the system of standards is in need of restructuring. The number of standards must be reduced to a minimum while improving their quality. And the developer and consumer must be given freedom of creativity, with the standards indicating only the most important requirements, say, compatibility of components and items. For example, it would be possible to return to a general standard for electric measurement instruments. This work could be done under a single contract-order and a single TZ by the leading enterprises of the branch. This is the kind of standard that would produce an appreciable and real economic effect.

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### Limited Price Fluctuation Advocated

18200191m Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87  
pp 150-160

[Article by Yu. I. Mukhin, chief of the Central Plant Laboratory of the Ferrous Alloy Plant (Yermak, Pavlodar Oblast): "Forward...With Standard Steps"]

[Text] The first ship loaded with ferrosilicon manufactured at the Yermak Ferroalloy Plant arrived in one of the Western ports in the middle of 1983. The unloading of the ship marked the beginning of this alloy on the Western market. The ferrous alloy workers of this country felt beyond competition in their own homeland and were also successfully working for exports. The sale of 50,000 tons of Soviet alloy for convertible currency showed that the Soviet product could compete and that it was of high quality.

A wave of pressure on the government arose in the Western press in order to make it prohibit the importing of Soviet ferrosilicon. Telegrams and open letters to the head of state from ferroalloy producers began to increase. The International Trade Commission considered the "case" of the Soviet ferrosilicon. The process evoked an immense amount of interest and was reported on television. The examination of the case proved that our country was acting quite properly in trade transactions and now the ferrosilicon from Yermak occupied a stable position in the Western market.

This episode shows not only our ability to operate successfully on the world market, but it also shows how much depends on the enterprise and on the plant workers.

We are obliged to see before us mainly the needs of the consumer and to strive to satisfy them in all ways. But what does our supplier actually see? He sees standards, norms, technical specifications, construction norms and

rules, and other paper. Of course, all these normative documents are "insurance certificates" for the consumers. A vigilant Gosstandart and a strict procurator, omnipresent people's control and a dispassionate Gosarbitrazh stand up for their defense. All this is correct, but the insurance certificates themselves protect mainly the supplier, and the consumer comes second and only on the average. He (the supplier) does not see us.

Here is the classic example of the need for standards and other normatives. Threading can be of any diameter, but it is standardized by a particular scale. For example, a designer has calculated the diameter of the threading of a bolt for fastening a part at 6.5 millimeters. There are no standard bolts with this threading, and he will be obliged to take either an M6 or an M8 bolt, in one case weakening the fastening and in the other making the part less sturdy. But then the supplier of the bolts, instead of having a thousand type sizes of the instrument which he would rarely use, has a scale that is limited by the GOST and a limited assortment. All this on the whole is advantageous to the state, but in the state standards are more advantageous to the supplier.

There could be an objection. The USSR Gosstandart not only protects the standard itself, but also it checks to make sure that the supplier does not pass off to the consumer an unsuitable product under the guise of a standard one—defective work. This means that the consumer is protected from deception. But it is the consumer himself who is the first to check on this, and with the help of the State Arbitration Board he can take extremely effective measures. But then it is only these organizations that are capable of discovering a real deception, for it is necessary to be a specialist in the matter that is being supervised. Nobody can find a defect better than the consumer's technical control division.

Let us give an example. The Yermak Ferroalloy Plant delivers ferrochrome silicon in keeping with two documents (the standard and the technical specifications). According to the standard the finely crushed alloy should be packed in steel drums, but according to the technical specifications it can be shipped in bulk. There is a certain difference in the chemical composition, and one of our consumers has requested a combination—to deliver the alloy of the composition envisioned by the GOST, but in bulk: he did not have names for mechanizing the processing of packed cargoes. The plant complied with this request from the consumer. At the end of the year, the inspector of the Karaganda Center for Standardization and Metrology inspected the plant and discovered this fact. The plant was not given credit for the sale of all 520 tons of alloy that had been delivered to the consumer by this time, and 161,200 rubles were deducted from the plant's account. They did not manage to convince the Karaganda Center that if it were to fulfill the GOST the plant would have senselessly wasted no less than 40,000 rubles on packaging: after all, the Center for Standardization is not instructed to protect the interests of the state; it is instructed only to verify the fulfillment of

GOST's, TU's and other normative documents. The plant immediately abolished the order-schedule and began to order-deliver the alloy to the consumer in keeping with the TU; this was not exactly what was needed, but it was legal! One can say that the plant should have changed the standard, but, after all, this would have taken years, and the plant has more than 350 consumers within the USSR and its commitments to them change annually. Moreover, in a number of cases this alloy has to be packed.

The plan receives a carbon reducing agent. In other branches of industry this reducing agent is used completely, but the specific nature of our production makes it necessary to remove the fines. And we spend immense amounts of money on removing the fines and we send out hundreds of carloads of it at reduced price, sometimes to the place where it came from several thousand kilometers away. The suppliers themselves do not want to do this: why take on excess expenditures? They are working according to the state standard. It cannot be changed, but what can be done by those consumers who cannot meet the given specifications? Stop delivering to them?

We have had two cranes working on an open trestle for 18 years now. The volume of work has increased and we sent out another one. But here is the misfortune: during this time, the requirements for this modification of cranes changed. Now they can operate only in covered premises. Nobody objects to the operation of the two old cranes: when they were installed those were the requirements. But one must not introduce new ones. For 3 years the plant has been trying to solve this problem, but no one will give permission to violate the standard or to change it individually for our plant either.

We need a plan for a small production building in which the equipment we need can be kept. The plant constructed a similar building 15 years ago. The planners are fulfilling the order, but the building they are designing is 10 times larger. Why? Because this is what the norms for the plan require. It is not important that it will be impossible to heat such a building: the norms for the bulk of the building have been met and this is the main thing. It is not important that it will be impossible to keep it clean: the norms for the areas have been met. It is not important that it will be constantly dusty: the plan includes a special area with ventilation installations whose capacities exceed the capacity of the installed equipment. It is not important that it will be difficult for the people to work here, and it is not important how much it costs. Not a single requirement of the client is important! The only important thing is that the plan meet the norms for planning, and only in this case will it be a "high quality" plan....

But if it is bad for the consumer, perhaps it is very good for the supplier? No, not especially. In the first place, he himself is also a consumer, and, in the second place, it is the supplier over whom the Gosstandart exercises the

most senseless and costly control. And therefore his initiative and his desire to be of advantage to the state are most reliably held back by the standards.

Because of objective factors, the plant produces a significant quantity of metal with properties that exceed the requirements of the documents. It would be advantageous to the state if we were to sell it immediately, but we waste money on making it conform to the requirements of the standard. And this is sometimes carried to the point of being absurd. We have mastered the output of an alloy of ferrosilicon with barium, for which there is an immense demand, but until their consumer finally develops his specifications for it, it is included in the first quality category. The shop that produces this alloy at the expense of its main assortment reduces the output of products with the Emblem of Quality and, consequently, is threatened with having its bonus removed because of "poor product quality." The ferrosilicon for which there is such a demand abroad is evaluated in the second quality category at home. If for any reason it were not delivered for export the shop would also lose its bonus "because of poor product quality."

All these examples, and one could give many, many more of them, show the same thing. Under today's conditions the plant is doomed to move only with standard steps, in a standard direction, and at a standard speed. The USSR Gosstandart will not allow us to move in any other way.

The state needs standards in order to provide for the sale of the products of suppliers who do not know the precise people to whom their products will go. The standards prevent large losses, but they do not provide the national economy with maximum profit. Maximum profit can be produced only when the supplier works individually with the consumer, and fills individual orders. And the fact that this is not always possible yet does not mean that it will never be possible in any cases. The standard is the average level which on the average satisfies everyone; it is necessary: one cannot do without it, but this is only the average state of affairs, and one cannot achieve maximum effectiveness by setting an average condition of the economy as one's goal.

We set a goal for ourselves: to reach the level of world standards. But here too the approach must be well thought out and not blind. For what is good in one country can be ineffective in another.

The desire to compare our standards with Western standards frequently leads to a situation where industry spends money and energy on obtaining a parameter that makes no significant difference and was reached abroad without any difficulty because of some objective reality, for example, the peculiarities of the raw material. Blind comparison with world standards is not inexpensive. For example, a plant spends immense efforts in order to reduce the aluminum content in ferrosilicon. But this impurity is harmful only for an insignificant number of

consumers and the rest of them put aluminum into steel along with the ferrosilicon. We questioned large metallurgical combines about whether or not they wanted ferrosilicon with a certain percentage of aluminum. They said they did because this produces a large effect. Then we went to the Central Scientific Research Institute of Ferrous Metallurgy with a request to change the TU. "It is in general a good thing," they said there, "but...large-scale industrial testing would be needed." But how can this be done? To do this we must deliver to the steel smelters hundreds of thousands of tons of the alloy which will be counted on the documents as rejected work or we would have to create a TU for an "experimental batch." In this case the metal of the experimental batch would not have the Emblem of Quality and the plant would be deprived of its bonus. And we do not need all of these contrivances; we just want to serve the consumer better.

In May 1985 I participated in the regular negotiations with the leaders of one of the firms (our buyer) and another firm that was conducting control analyses of the product. I asked the head of the control firm which country's standard would be used fake a standard as the basis. Seeing my confusion the head of the firm explained approximately the following: "The standard does not know where, when and under what conditions the firm will take the specimen, but the firm does. The task of the firm is to obtain an analysis that completely satisfies its consumers (the purchaser and the seller) and not the standard. The consumers pay money to the firm and not to the standard, and if we begin to satisfy the standard and not the consumers we will be out of work very soon."

The buyer himself also looks on the standard as a document that helps to market metal successfully and not as a dogma. According to the agreement the firm receives metal with a silicon content of more than 45 percent. But when it was offered metal from another plant where the silicon was 42 percent (at the same price for the percentage of silicon), the firm took it. Yes, there will be certain difficulties, but that is all.

How can one speak about the introduction of something new if the entire country is obliged to produce only standard products, and the output of new ones involves immense losses of time and effort as well as economic losses for the enterprises that are the initiators?

The USSR Gosstandart today is an organization that does not bear economic responsibility but has the right to impose requirements on cost accounting [khozraschet] enterprises even if it causes them losses. Not only its control but even minor services (that are mandatory for the enterprises) are incredibly costly. For example, inspecting a set of weights for analytical scales costs 13.5 rubles at the prices of the supervisory laboratory of the

Gosstandart, not including shipment, and the price of a new set of these weights is 5 rubles. And there is nowhere to turn: if you do not agree to the "service" you will be fined.

Since the USSR Gosstandart was created for industry it should work for it, it should have cost accounting, it should work on orders from industry, and it should bear economic and legal responsibility for its services and for the consequences of its decisions and the quality of documents. At the present time we have reduced the idea of standardization to the absurd. Instead of an industrial partner that suggests which product to produce in order to ensure maximum sales with minimum outlays, the Gosstandart has become an organization that has the right to force industry to produce only standard products and only by standard methods. And it is always standing on the sidelines while all the losses always fall on the shoulders of industry. Yet the Gosstandart actually does not develop either standards or norms; all this is done by industry itself and the Gosstandart only checks on unconditional fulfillment of formalities. The idea that "violation of a standard is prosecuted by the law," which prohibits deception of the consumer and guarantees him an item that has the properties indicated by the standard, should be replaced with the idea that "the one who produces the thing for which papers are not preliminarily filled out in the Gosstandart will be punished according to the law."

Standard products and prices cannot serve as a basis for calculating planned assignments for production, production cost, profit, and fund revenues. Within the limits of planning assignments the enterprises, which bear full responsibility for their financial activity, should have the right to agree upon deliveries of any products at any price if the price for this product is advantageous to them. And this should be done operationally, right down to making decisions on the telephone.

Questions of quality are closely related to the price. Today it is based only on the production cost of the product, and the consumer value is not significantly reflected in the price. This in no way stimulates either improvement of product quality or the output of new kinds of products. For example, the Yermak Ferroalloy Plant has already mastered the production of the aforementioned ferrosilicon with barium according to a new technology. Immense efforts were expended on this by the plant services. But the price of the ton-percentage of barium decreased as compared to the price list by a factor of 8.5! Now if the plant prepares a large batch of this alloy it can receive several tens of rubles of profit per ton, but if the batch is small, it is produced at a loss. And for the consumer, the economic effect from utilizing a ton of our alloy is from 500 to 2,500 rubles. Of course all this money goes to the state, but the economic incongruity—the risk and difficulty of assimilation—goes to the supplier while the profit goes to the consumer.

State standards, specifications, norms and rules must be what they must be—a third position at which the supplier and consumer must arrive if they do not come to a more advantageous agreement. If the supplier offers the consumer products with a level of indicators that, in the opinion of the latter, will cause losses, the consumer demands that the seller reduce the price by the amount that compensates for the losses. And if the supplier does not agree to such a price reduction, then the consumer orders him to deliver the product according to the GOST, if necessary, calling upon the State Arbitration Board and imposing fines. If they agree but more of these products are consumed, then the supplier will be obliged to fully satisfy the consumer without including the surplus deliveries in his sales plan.

If the supplier offers products with improved quality that bring about additional profit for the consumer, the producer should have the right to demand some of this additional profit in the form of an increment to the price, and if the consumer refuses to pay, the product should be delivered to him according to the GOST. If less of this product is required than is indicated in the order for products that meet the GOST's, the sales plan will be considered to be completely fulfilled.

A single quality and a single price will be in effect only for products that correspond to the GOST, which, incidentally, will not subsequently impede the improvement of standards or the assignment of new prices on the basis of already existing levels of quality and price. The processes of producing technical specifications and price setting are simplified. But the main thing is that product quality will determine the profit for the enterprise and, in the final analysis, for the state as well.

A contradiction is resolved this way: without competition and free prices it is difficult to obtain high-quality goods in the necessary quantity with a minimum cost, but with competition and free prices it is impossible to carry out state planning and price setting. If we use as a basis the idea suggested in this article we will bring about a competition between standard and nonstandard goods, but all this will be in the framework of state plans, and the prices will fluctuate within the levels of standard prices, which are also under the control of the state.

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#### Shortcomings of Standards Administration

18200191n Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87 pp 158-159

[Article by Yu. Ya. Degtyarev, head designer of the KTOS of the TekhnologNPO (Tashkent): "Not the Standards But People Are to Blame"]

[Text] Designers, technologists, journalists, production leaders, workers... are all dissatisfied with the standards. Sometimes the criticism is very harsh. But it is not their harsh tone that causes one to enter into a polemic with them. The fact is that this criticism is almost always directed to the wrong people.

Criticism of standards without attempting to figure out specifically who produced the standard and why, why it is the way it is, "to whom it is advantageous," and so forth, is almost always empty criticism. This kind of criticism undermines the respect of the society for standards and standardization in general and asserts a moral right to deviate from "poor" standards. And yet the causes of the poor quality of standards are not revealed.

Unfortunately, many production workers, even qualified ones, do not know enough about standards and do not show any interest in these issues although they pertain to them directly. For example, why not take the standard and look to see who has developed it, who has coordinated it, when it was developed and put into effect, and when it was last revised? Why not go even further and find out if the draft of this standard was not sent to the enterprise for a response and what response the enterprise sent back to the developers of the draft? In the end, one could also find out what the policy is for making changes in standards and how to make the necessary change. Although it is also necessary to present standards in such a way that they are all understood the same way, this is not always done in practice. Moreover, the standards should be revised every 5 years. If necessary this period can be reduced.

The standards really should be established and made mandatory for the utilization of the achievements of science, technology and advanced practice, but they should not preserve them and they should not be an obstacle to improving processes and items.

Unfortunately, standards have turned out to be a very convenient means of protection and even the establishment of local, departmental interests at the state level. As a rule, the development of standards is entrusted to departments that are the basic producers of the standardized product. Branch institutes that develop standards end up under the administrative jurisdiction of the same management agency as the producers of the products, and this leads to a situation where not a single requirement that is disadvantageous to the producer is included in the standard. Because of the artificially maintained deficit and the fears of the consumer are being deprived of deliveries of batching items, the influence of the consumer on the quality of standards is quite negligible. And so there is a larger number of standards that are outdated even before they are put into effect.

But if someone cannot stand the oppression of these "conductors" of technical progress, it is useful to recall that it is not the paper that is to blame but the people who are so happy to cover themselves with it. The

criticism should be aimed at them. Incidentally, it may be that the people are not bad in and of themselves and that they are not deliberate opponents of public well-being, but their position makes it incumbent on them "to create things that are not coordinated with state interests. With all the production conditions, sometimes very rigid ones, they are oriented toward the observance of exclusively branch interests.... All the shortcomings of branch management of the national economy are reflected in hypertrophied form in the state system of standardization, and they are strengthened by the imperfection of the mechanism for economic management. And the final results of this kind of management were the motivation for this discussion.

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### Paperwork For Product Certification Discussed

18200191o Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87 p 161

[Article by V. A. Smirnov, engineer-designer, Category I (Moscow): " 'Paper' Certification and the Same Kind of Quality"]

[Text] Up until 2 June 1969 industrial products were manufactured according to the requirements of GOST's and there were no increments to the price of the items because of this, since the GOST requirements were the norm. But now according to documents for certification the item that corresponds to the GOST parameters receives an increment to the price. It turns out that a "bonus" is paid in the form of a 30-percent increment to the price for ordinary fulfillment of GOST requirements. Does this not mean that the quality of industrial products is decreasing and the requirements of the GOST's are not being fulfilled?

It is known that GOST's are revised regularly and the requirements on which they are based are at the level of the best domestic and foreign items. But product certification is regulated by a multitude of "new" documents. Why is it necessary to have another long list of provisions for certification?

My personal opinion is that product certification is purely a "paperwork" process. Both the old chart of the level and the new one (GOST 2116-84 "Chart of Technical Level and Product Quality") can be changed just as long as the title sheet is not touched—it includes the signatures for the coordination and the stamps of the coordinating organizations. Nobody can tell whether or not this chart reflects the true level of the certified item. Ask any specialist who has anything to do with the formation of charts for the technical level and quality

where he gets the foreign analogue? And is it really the best? For this foreign analogue is selected in such a way that our domestic item does not look worse against its background....

The technical characteristics for many kinds of products are considerably worse than the best world analogues. Here it might help to create all-union catalogues for the various kinds of items. But the Gosstandart does not produce these. And nobody has any complaints about the technical level of our "best" items which thus compare with the "best" foreign model! Except for the consumer....

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### Change in Product Certification Urged

18200191p Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87  
pp 162-167

[Article by G. G. Azgaldov, doctor of economic sciences (Moscow): "On the Path to a New System of Product Certification"]

[Text] The question in the letter from V. A. Smirnov is, What we need is a certification system of product quality for and whether it is really necessary at all if there are GOST's. The certification system as part of the overall system of standardization is a reality of our economic life. About 30,000 kinds of products now have the Emblem of Quality. But how do these standards affect product quality?

The development and introduction of the certification system that has been functioning in our country for more than 10 years was a large organizational and technical achievement at one time. In this respect we had to blaze a new trail. And it is natural that on this new and extremely difficult path one would have to see the shortcomings of the initial system of certification, including those discussed in the letter from V. A. Smirnov. Hence there arises the task of improving this system. This certification system is being revised. Thus on 1 January 1984 the country introduced a second, modernized system of certification that was developed by Gosstandart specialists. The essence of this system is that the products are certified in two product categories—highest and first—instead of three, as was formerly the case. The existing rules for certification contain principally new requirements for products seeking the Emblem of Quality. This system also has shortcoming which I shall mention below, and it will need improvement in the near future.

Although industry has reached a practical application of such a system of evaluation of quality on the scale of the country relatively recently, as early as 1921 V. I. Lenin suggested introducing a numerical index which could be used each month to determine the condition of individual branches and the national economy as a whole (taking product quality into account as well). V. I. Lenin called this "an index number" and thought that the Central Statistical Administration and the Gosplan could assimilate it. On the basis of this index it would be possible to obtain certain data concerning the dynamics of scientific and technical progress, for example, in the form of the difference between the January (since V. I. Lenin suggested doing this monthly) and the subsequent monthly indexes. Subsequently it would be possible to have such indexes for the branches and enterprises. Of course it would be very desirable for the reliability of these indexes (or the symbols in the form of the Emblem of Quality) not to drop during the intervals between certifications. In other words, for example, the Emblem of Quality that has been conferred on some kind of product, should show that the quality of this product has not changed during the period when the Emblem of Quality has been in effect.

Unfortunately, this important requirement is rarely met in practice. And this is one of the reasons for the lack of confidence in product certification in general, which was expressed in V. A. Smirnov's letter. For example, in 1984 20 percent of the machine building products that were removed from production as obsolete had the Emblem of Quality. The situation has not improved much today.

It is expedient to conduct certification for the totality of all properties characterizing the product and not simply certain of the most important properties as is now the case. And it is necessary to take into account the entire totality of qualities also, for example, when the certified model is compared with an analogue where the values of the indicators of individual properties could be the same as those of the certified model. In practice, in order to reduce the labor-intensiveness, all these properties are usually ignored. The models are compared taking into account only those properties whose indicators differ in the models that are compared. But this is not the way it should be done: the result of the certification will be distorted. With this approach there would be a loss of information about how much (or by what factor) the quality of the certified model differs from the analogue.

When determining the standard (base) values for indicators of each property one cannot do what is now being done everywhere in practice: select one domestic and three foreign analogues and the best values of indicators in them are taken for standard (base) ones. With this policy for selecting standard values there is a high probability that the results of the certification will be distorted. In order to eliminate this danger the standard (base) value should be assigned with respect not to three foreign analogues, but for the best values of the indicator for each individual property.

Incorrect accounting for reliability indicators also reduces the reliability of the results of product certification. In both the old and the modernized systems of certification the indicators of reliability were rated along with other indicators that characterized quality, for example, they are assigned coefficients of importance. Because of the low level of reliability of the results of certification there is also a low level of reliability of the information necessary to the consumer in the domestic or foreign market. The Emblem of Quality on products sometimes means very little.

What information should the buyer receive when purchasing a commodity? It seems that this information should characterize, in the first place, the property of the product to which the consumer is accustomed and which has meaning to him, and, in the second place, that property of the product that most fully determines its usefulness to the consumer. Obviously, only one property of the product has these features—its quality. Therefore the object of certification of a prepared product should be not the quality of the plan from which it was manufactured nor the quality of the materials that have gone into its manufacture nor the quality of the work on its creation, but the more general characteristic on which these characteristics depend: the quality of the product as a whole. There is no simple answer to this. Of course, when exporting products for production purposes, in addition to a comprehensive evaluation of its quality, one can also give values of individual indicators of the most important properties.

In a modern society when the consumer acquires some kind of product he usually can select among several varieties. In other words, he ends up in a situation of choice. And he can choose according to quality. In order to facilitate this choice it is expedient to provide general information about the relative quality of the models of products for similar purposes. It is very convenient here to have a comparative evaluation of the quality in percentages (the product with the highest quality is taken as 100 percent). For the consumer on the domestic market, the only products that are compared (domestic or imported) are the ones that actually come into the trade network. In this case the evaluation of 100 percent is given to the model of product that has the highest quality among those commodities for similar purposes that are sold in the Soviet trade network.

True, the "ability to compete" of many kinds of products can be determined not only by the quality, but also by the price. But this means only that for these kinds of products the quantitative evaluation should be given not with respect to quality, but with respect to integrated quality, that is, the most general characteristic that accumulates information both about quality and about total expenditures on the acquisition and consumption of the product.

But now let us take a look at how all that has been mentioned above is reflected in the systems of product certification we have developed.

First of all, any system of certification should be introduced on the basis of a comparison of several variants of such systems (actually existing or theoretically possible) and a selection of the best variant. For example, one can compare three systems of certification. The first is the old system that was in effect up until 1984. The second is the system introduced on 1 January 1984 (above it was arbitrarily called modernized). The main difference between the old system and the new one, as we have already said, is that the new one envisions the existence of only two quality categories (highest and first) instead of the former three categories. What does this mean? Practice shows that the effect is not great yet.

But the basic features of the new system of certification that is being proposed by specialists, which has been written about repeatedly, consists in the following: for various groups of products, taking into account their unequal importance for the national economy as a whole, for the planned (for example, 5-year) period one establishes a directive value of the comprehensive quality indicator. At the same time, a system of material incentives is introduced which is directed toward maintaining this directive value of the quality indicator. Those models of the product that are on the domestic market whose quality is no worse than the established value are awarded the Emblem of Quality.

I shall discuss briefly the merits of the proposed system as compared to the two preceding systems.

One of the most important advantages is the fact that it contributes to scientific and technical progress, which cannot be said about the other two systems developed by the Gosstandart. Thus during 1979-1980, according to data of machine-building ministries, practically no products of poor quality were produced (that is, those included in the second category). Another most important function is practically not fulfilled—stimulating technical progress, about which V. A. Smirnov correctly wrote. The overall tendency in world technical progress is to reduce the time periods for updating products. We have the opposite picture: from 1970 through 1980 the proportion of machine building products in production for more than 10 years increased from 19 to 29 percent. All these cases were not eliminated within the framework of the modernized system either. Therefore even today the situation has not improved. Even in Leningrad, for example, half of the items with the Emblem of Quality have been produced for more than 10 years.

The proposed system will be able to provide for reliability of the results of certification throughout the entire period when it is in effect. Now the time period for which the Emblem of Quality is conferred (or the quality category is established) ranges from 1 to 5 years. But during such a long period of time world scientific and technical progress inevitably leads to improvement of the standard (base) values of indicators for the majority of kinds of products. In certain branches (for example, electronics) this improvement with respect to many most



important indicators can be 5- or even 10-fold. This means that during this period there will be an inevitable reduction of the quality of domestic products that are produced without any change. And this reduction in principle cannot be "caught" within the framework of the two systems developed by the USSR Gosstandart. As a result, it is quite probable that there will be a situation (and practice has confirmed this many times) in which the products which have deservedly been given an Emblem of Quality, within a year or a year and a half, drop below the world level but they continue to be marked by this emblem. The same thing pertains to the reliability of information on both the domestic and foreign markets. At the same time the new system, which envisions relatively short time periods during which the standard values remain unchanged (from one quarter to one year) is capable of reacting much more quickly to the achievements of world technical progress and providing for reliability of the results of certification in time.

As was stated above, the former and the modernized systems do not provide enough precision of the results of certification. I shall give three basic reasons for this shortcoming. In the first place, when evaluating quality they operate not with a complete list of indicators, but only with certain most important indicators; in the second place, the standard (base) values very frequently do not correspond to the world level because the selection of the analogue models with respect to which these standard values are determined is very small (one domestic and three foreign models). And, in the third place, the small degree of precision of the results of certification is predetermined principally by incorrect accounting for the indicators of reliability. The proposed system does not have these shortcomings and provides for greater precision of the results than one receives with the two other systems that are being compared.

As we have already noted, the two systems developed by the Gosstandart do not contribute to reliably informing the consumer about product quality since the manufacturers, who are interested in having it included in the high quality categories, "suppress" the consumer and the consumer does not have the opportunity actually to affect this process. According to the authoritative statement of the USSR deputy minister of foreign trade, N. N. Snelyakov, the evaluations of product quality given by the agencies of the Ministry of Foreign Trade are 2-3 times lower than the evaluations given by the manufacturing ministries within the framework of the former system of certification. And it is not surprising that with such a low level of precision of the evaluation (and the lack of objectivity in the judgment of the ability of domestic products to compete that is caused by this) in USSR exports the proportion of machines and equipment amounted to 13.6 percent in 1985 and in exports to capitalist countries this percentage was even lower. This shortcoming, which is related to the high level of imprecision of the quality evaluation, is in principle impossible within the framework of the certification system that is being discussed.

So far there are no substantiated figures that make it possible to compare precisely the expenditures on the development, introduction, and application of each certification system. But rough calculations show that these expenditures are approximately comparable for each system.

As a result, there is no doubt about the conclusion concerning the advantages of the proposed system. But one question remains unclear: how can our industry reach the optimal system of certification of product quality?

It seems that when in the near future it is necessary to adjust (or replace) the currently existing certification system it will be absolutely necessary to take into account both the negative experience that has been revealed in practice and the recommendations of theory which have been discussed above.

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### **Contradictions, Unmarketable Goods Due To Standardization**

*18200191q Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 87 pp 168-172*

[Article by B. A. Urvantsev, candidate of philosophical sciences, All-Union Scientific Research Institute of Metrology (branch) (Sverdlovsk): "The Contradictions of Standardization, or What Impedes the Solution to the Problem of Product Quality"]

[Text] It is no secret to anyone that our stores are heaped full of goods for which there is no demand and obsolete machines and equipment are sitting around in the warehouses of our enterprises and organizations gathering dust and rusting. Such a phenomenon is usually considered a disgrace, extravagance, irresponsibility.... But we must not be too hasty with conclusions: unmarketable goods and unutilized technical equipment are manufactured in keeping with the requirements of existing standards. Not a single item is produced without the established GOST's, OST's, RST's or TU's of which there are about 220,000 in effect in the USSR today! Add to these millions of standards of enterprises and other guideline documentation.

As you can see, there is an immense mass of documents. A large proportion of them are intended to ensure the proper quality of products that are produced. And in spite of this the quality remains, as has been repeatedly emphasized in the materials of the 27th CPSU Congress, one of the most important and crucial modern problems. Even in such a developed region as the Central Urals the

proportion of products produced under the past five-year plan with the state Emblem of Quality amounts to only 20.7 percent of the overall production volume. It is within this range on the whole throughout the country.

What are the reasons for this? There are many, since product quality is a multifaceted phenomenon and involves scientific, technical, economic, social, psychological and other aspects. I shall discuss only those which to some degree answer the question raised in the title of this article.

In the state system of standardization it is mandatory to make sure that the products that are produced correspond strictly to the requirements of the established standards. This is basically a positive principle but in production and in standardization it has brought about a number of contradictions and negative aspects. Enterprise managers, designers and standardizers have unequivocally responded as follows to this principle: since the product that is produced must strictly correspond to the standard, the standard should correspond precisely to it. So in order to avoid all kinds of formal unpleasantness, in the normative and technical documents for the item it is necessary to establish only those quality indicators which have actually been reached and can undoubtedly be provided by production. This is what they have thought and this is what they have begun to do everywhere.

An analysis of the practice of standardization and product quality control shows that its history is essentially a matter of the history of the established standardization which is interwoven with scientific and technical progress and discussions of the decisive role of standardization are so far only discussions. Of the 220,000 normative-technical documents taken by the Gosstandart one can only find a few that are progressive and actually surpass the quality level that has been reached, for even standards for items with the state Emblem of Quality only establish that which has already been well assimilated by production, and they do not provide any significant new impetus for technical progress.

Is it necessary for the products to formally correspond to the standards and vice versa? Perhaps one should develop and apply a system not of coercion, but of economic incentives for enterprises to introduce and observe standards voluntarily, out of their own interests?

Today, when our country's economy has entered on a course toward intensification, it is also necessary to make radical changes in standardization. We should make the state standardization system more flexible, informal and an effective means that works for the consumers and the purchasers. It is they and not only the head institutes for standardization that should be given the right to decide which standards correspond most to the needs of the national economy and the country's population and which changes should be made and when.

Changes in standardization are also necessary in connection with the publication on 12 July 1985 of the Decree of the CPSU Central Committee and the USSR Council of Ministers, "On Broad Dissemination of New Methods of Management and the Strengthening of Their Influence on the Acceleration of Scientific and Technical Progress." It introduces increments to the wholesale price for items of the highest quality category and rebates from the wholesale price when the products are certified in the first quality category. Since with the publication of the decree the enterprises are economically interested in producing products of high quality, they will strive (and this is beginning to be manifested) at any price to certify their products with the State Emblem of Quality or include them in a category that is not subject to certification. Under these conditions it is important to increase the competence, knowledge, adherence to principles and responsibility for decisions made by the State Certification Commissions (GAK). In their work so far there are quite a few various omissions, which is shown by the fact that more than one-fourth of the materials for product certification that came into the VNIKI of the Gosstandart, for example, in 1985 were refused registration.

The GAK's should include not so much "narrow" specialists who are knowledgeable about the technical parameters of the product as representatives of interbranch agencies who have broader perspectives, systematic thinking, and are informed about the real needs of the country's national economy and population. Such specialists should become highly qualified standardizers. But here we come up against the shortage of specialists in this area and the lack of development of the theory of standardization.

According to data of the All-Union Scientific Research Institute of Standardization, about 3 million various specialists are employed in the development and application of standards in the country, including about 9,000 scientific associates. How are they trained?

In 1970 the CPSU Central Committee and the USSR Council of Ministers adopted the decree "On Increasing the Role of Standards in the Improvement of the Quality of Products That Are Produced." Right along with technical and economic measures, it includes the decision to train standardizers in higher and secondary educational institutions. Beginning in 1973 the program of VUZes and tekhnikums had from 10 to 20 (in rare cases up to 40) training hours for teaching of the fundamentals of standardization. These hours were distributed among the specialized departments, and the lecturing on the subject was interesting to instructors of various professions.

About 16 years passed. The VUZes, as before, are not producing standardizers. The young engineers must begin to learn about standards practically from scratch. And if they have occasion to be engaged in standardization professionally, they can take a course in the All-Union Institute for Increasing the Qualifications of

Management and Engineering and Technical Personnel in the area of standardization, metrology and quality control (VISM). But several thousand students pass through it in a year and, naturally, it cannot satisfy the needs of all branches and enterprises. Moreover, the methods of this institute typically have a certain utilitarian-technocratic approach. Even in the program for the recently introduced discipline of "theory and practice of standardization," of the 100 lecture hours not a single (!) hour is devoted to the really theoretical aspects of standardization or its social essence. The "new" program includes basically old issues pertaining to standardization agencies and services and their official procedures that regulate the form and policy for the development of normative-technical documentation.

The low level of study of the fundamentals of standardization in educational institutions can be fully explained: there is nothing to teach, since the theoretical foundations and methodology are poorly developed. The teaching is done from poorly recalled normative documents or from books compiled of them that are written in dry language and are distinguished from the style of normative documents only by the freer presentation of the requirements of the standards. Better, scientifically substantiated textbooks of standardization are extremely necessary both for VUZes and for tekhnikums and for VISM courses.

But who will develop the theoretical fundamentals of standardization?

Scientific associates of the Scientific Research Institute of the Gosstandart System? In principle they could deal with the theoretical problems of standardization, but utilitarian-applied problems absorb most of their time and energy. The country's VUZes have no specialized departments of standardization. In the system of the USSR Academy of Sciences standardization is perceived as an applied technical discipline and not a social science or general methodological discipline. The Gosstandart and its head organization, the All-Union Scientific Research Institute of Standardization, possibly, could object that on the thematic plane the VNIIS has envisioned the development of scientific-methodological fundamentals of standardization. Such work is indeed being done there, but these fundamentals amount to sets of standards. There is a fundamental divergence of concepts here: the standards themselves cannot replace the theoretical fundamentals of standardization as one of the kinds of social ordering.

It is now being emphasized in party documents that it is necessary to increase the responsibility for the quality of the results of labor. But one must not forget that it is not enough to have simply responsibility or solving problems of the quality of labor and products. First of all it is necessary to make the individual responsible for quality, and he must be taught to work well. The scientific and technical level of standards and the quality of the products produced according to them are directly dependent

on the training of personnel, the level of their qualifications, the level of their knowledge, and each person's attitude toward standardization and the quality of products and labor. Everything is interconnected here. But the existing system of knowledge and training of standardizers cannot hold up under the most elementary requirements. In resolving this contradiction, I think that the primary role should be played by the Gosstandart and its leading scientific research institutes. But, as we know, success is possible only with activity, consistency, persistence and efficiency, which these organizations do not always have. And this is undoubtedly also one of the impediments to solving the problem of product quality.

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#### Relationship Between Wages and Labor

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[Article by T. G. Kraykova, candidate of economic sciences, Kuybyshev Planning Institute: "Labor Productivity and the Wage Fund"]

[Text] The 27th CPSU Congress named improvement of the economic mechanism, one subsystem of which is material incentive, among the basic problems whose resolution will contribute to accelerating the country's socioeconomic development in future years.

This improvement presupposes first and foremost a change in the policy for planning the basic part of the fund for payment for labor: the wage fund (WF) and the material incentive fund (MIF). One of the criteria for scientific substantiation of material incentives, as well as the management mechanism as a whole, is completeness in the accounting for the requirements of objective economic laws of socialism. A special role in its organization is played by the utilization of such laws as distribution according to labor, which regulates the interconnection between quality and quantity of labor, on the one hand, and the amount of remuneration for labor, on the other, and the law that the growth of labor productivity must be faster than the growth of the average earnings.

Accounting for the requirements of the aforementioned objective economic laws means that as fund-forming indicators it is necessary and sufficient to take labor productivity, which characterizes the quantity of labor of each worker, taking its result into account, and one of the indicators of the quality of labor.

Since the MIF is part of the wage fund which is primarily made up of the WF, consequently, a change in the MIF must have a certain relationship to a change in the WF. Moreover, the MIF is not only a part of the wage fund but also a part of the profit and hence in the methods for forming the fund it is also necessary to take into account a particular ratio between its changes and changes in profit. The requirement that labor productivity increased more rapidly than the average earnings presupposes that the WF and the MIF have been formed through their average amount per one worker in industry and production.

The objectiveness of the methods for planning the WF and the MIF depends, moreover, on the interpretation of the structure of the wage fund. There are still serious disagreements regarding this question. The most disputed when constructing this system is the question of the relationship between the guaranteed wage fund (GWF) and the amount earned.

It seems that the WF must be divided into two parts: a relatively stable (guaranteed) one, for which the wage rate-salary part of the WF is used, and a variable one, which is intended to stimulate improvement of the quality of collective labor and to increase its quantity and results. The variable of the WF includes the part of the wage rate-salary earnings envisioned for stimulation of more complicated, responsible, and less attractive, physical and mentally difficult, monotonous labor; the bonus part of the WF and the piece-rate increments. It is precisely the variable part of the WF, which serves to stimulate the quantity and quality of labor taking its result into account, that should be determined according to the normatives. Dividing the WF by the guaranteed and stimulating parts requires that the normatives for the formation of the fund be established only in the form of an increase, that is, as the increase of the average wages in kopecks per ruble of increase in labor productivity as compared to the guaranteed part.

As distinct from the WF, all of the MIF is intended for incentive. Consequently, the normative for its formation should not be in the form of an increase. Otherwise part of the fund will be guaranteed to the collective.

A study of the special literature and the practice of forming the WF and MIF, which has changed significantly during the past five-year plans, convinces us that the formation of the GWF is in need of further study. Suffice it to compare the methods adopted by the USSR Gosplan for the 12th Five-Year Plan for forming the WF and MIF with the principles ensuing from the requirements of the aforementioned objective economic laws. Thus the indicators of increase in the volume of the normative part of the output (for the WF) and the reduction of expenditures per 1 ruble of commodity output or the increase in the calculated profit (for the FNP) cannot be used as fund forming amounts since they do not characterize either the quantity of labor, taking its results into account, or the quality of labor.

Moreover, the methods being applied at the present time are too confusing because of numerous adjustments of the base wage funds and material incentives. Finally, the "guarantee" according to the existing methods, of part of the MIF at the level of the base year, even if there are various adjustments, does not correspond to the purpose of this fund or its economic essence.

The methods applied under the 12th Five-Year Plan for forming the WF and MIF do not take into account the quality of labor and do not monitor the relationship between the amounts of the WF and the MIF, nor do they observe other objective principles for their construction. Under these conditions the indicators of the average earnings and labor productivity cannot be compared, and the proportions that develop between their increases are uncontrolled and random. It is impossible to regulate that which cannot be objectively evaluated.

The issue of the relationship between centralization and decentralization in the determination of the WF is still sharply disputed. Thus at the All-Union Conference for Improving the Economic Mechanism in Industry, which was held in December 1982, they repeatedly raised the idea of the possibility and expediency of determining normatives for wages "from below," that is, directly at the enterprises. These statements are appearing in the press even at the present time. We think that the wage fund allotted by the USSR Gosplan for each ministry on the basis of the national economic proportions planned for them for the given period should be intelligently distributed among the various branches and enterprises, and not calculated locally.

The indicator of labor productivity is another matter. Its dynamics must be determined only locally, at the enterprises. It is what will make it possible for each collective to earn the wage fund and the material incentive fund.

The Kuybyshev Planning Institute has developed a variant of the methods for planning the fund for payment for labor (GWF)—the wage fund and the material incentive fund. The initial theoretical point that lies at its basis consists in that the GWF for each enterprise as the result of planned distribution of the wage and material incentive funds established for the given ministry by the USSR Gosplan.

The second point of departure for our methods is that each form of distribution according to labor (the wage fund and the material incentive fund) is intended to create a clear-cut dependency between the quantity and quality of the labor of the collective, its results, and the amounts of these funds. It is precisely the achievement of a correspondence between the measure of collective labor and the measure of payment for it that is the reliable prerequisite for establishing a correct proportion between the individual labor contribution and the personal income from public production.

The third initial position consists in that when determining the WF and MIF the only scientifically substantiated fund-forming indicators there can be are the indicators that characterize the quantity and quality of labor. For these we have used: the increase in labor productivity, the level of rate (salary) earnings, and the proportion of products of the highest quality category in the overall volume of production. An increase in labor productivity reflects the quality of labor taking its result into account, and the average rate or salary level of wages and the proportion of products of the highest category indicate the quality of the labor of the given collective.

In keeping with the recommended method, the normatives for the wage fund and material incentive fund are established for the year. The methodological devices for determining the WF and MIF in the annual and five-year cross-sections, and also the actual ones, in our opinion, should be the only ones since the principles that lie at the basis of the methods do not depend on the stage of planning.

Many years of research have shown that the indicators of the normative of wages used in the methodological guidelines of the USSR Gosplan under the 11th Five-Year Plan—in kopecks of the WF per ruble of production volume, and under the 12th Five-Year Plan—per 1 ruble of increase in volume of the normative net output are unacceptable: with these it is impossible to check on the given ratio between the increases in labor productivity and the average earnings.

Labor productivity for planning the GWF must be measured in keeping with its essence in the classical understanding as the productivity of live labor measured in terms of the totality of labor expenditures (live and embodied). The indicator determined according to the actual (calculated) net output and not the normative net output corresponds to it. (Footnote 1)

$$JP FChP = Q'fchp / Ch'ppp : Q^{\circ}fchp / Ch^{\circ}ppp = \\ Q'gross - T'ov / Ch'ppp \times \\ Ch^{\circ}ppp / Q^{\circ}gross - T^{\circ}ov = (Q'gross - T'ov / Q^{\circ}gross - T^{\circ}ov) \times \\ (Ch^{\circ}ppp / Ch'ppp) [1]$$

where JPfchp, Q'fchp, Q<sup>o</sup>fchp, Ch'ppp, Ch<sup>o</sup>ppp, Q'gross, Q<sup>o</sup>gross, T'ov, and T<sup>o</sup>ov—are, respectively, the index of labor productivity when measured according to the actual net output, the volume of actual net output according to the plan and to the report, the number of personnel of the plant according to the plan and to the report, the volume of gross output according to the plan and to the report, and embodied labor according to the plan and to the report (all material, raw material, and energy resources and amortization).

From the formula one can see that one fraction-factor reflects the changes in live labor (CH<sup>o</sup>ppp : Ch'ppp) while the other reflects the change in embodied labor (Q'gross - T'ov / Q<sup>o</sup>gross - T<sup>o</sup>ov).

Thus the dynamics of labor productivity determined according to the actual net output shows the effectiveness of live labor measured in terms of the total labor expenditures since it reflects the savings on live and embodied labor. With this measurement of labor productivity there is no need to introduce into the fund-forming system savings on material resources and certainly not a reduction of production cost.

The increase in labor productivity achieved under the influence of factors related only to the given collective might be subject to comparison with the growth of the average earnings. Only by eliminating the influence of external factors is it possible to evaluate objectively the fulfillment of the given ratios. The results of research have convinced us that in order to provide for the ratio necessary for the given period of time in each production unit, it should be established individually for the WF and MIF, which ensues from the difference in the rates of their increase.

The existing practice of applying various methods of planning the WF and MIF in terms of various indicators with different rates of their change makes control over the given difference between the increase in labor productivity and the average wages quite impossible.

In order to have differentiated accounting for factors that cause an increase in labor productivity and avoid double incentives (through the WF and MIF) one part of the increase in labor productivity, in keeping with the given methods, is taken into account in the planning of the wage fund and the other—in the formation of the material incentive fund. Thus the WF in branches with an interrupted production process includes the increase in labor productivity as a result of changes in the proportional labor-intensiveness, a reduction of time losses by all basic workers, and changes in the number of personnel and their structure, and the planning of the MIF includes the increase in labor productivity as a result of introducing new technical equipment and economizing on material, raw material, and energy resources. Under conditions of continuous production, when the MIF is formed one takes into account the same factors in the growth of labor productivity as with interrupted production, but in planning the WF one takes into account the increase in the productivity of a unit of technological equipment, the time fund for the operation of all technological equipment, and the change in the number of personnel at the enterprise as well as their structure.

This difference in the factors is possible only when measuring labor productivity according to actual net output and when planning it in terms of factor-arguments that cause a functional change in the indicator. (Footnote 2)

Taking into account what has been said, the normatives for determining the wage fund (WF) and material incentive fund (MIF) in keeping with the recommended method are calculated according to the formulas:

$$N_{\text{one for min.}}^{WF} = \frac{\Delta \bar{S}_{wf, \text{past year}}}{\left( \sum_{j-\text{ent.}}^n \Delta P \times K \bar{S}_{tar} \times Ch_{ppp} \right) : \sum_{j-\text{ent.}}^n Ch_{ppp}}; \quad (2)$$

$$N_{\text{one for min.}}^{MIF} = \frac{\bar{S}_{mif, \text{past year}}}{\left( \sum_{j-\text{ent.}}^n \Delta P \times K_{kach} \times \bar{S}_{wf} \times \bar{m}_{sav} \times Ch_{ppp} \right) : \sum_{j-\text{ent.}}^n Ch_{ppp}}; \quad (3)$$

where  $\bar{S}[\text{bar}]_{wf}$ ,  $\bar{S}[\text{bar}]_{mif}$ ,  $\Delta P$ ,  $K$ ,  $\bar{S}_{tar}$ ,  $K_{kach}$ ,  $Ch_{ppp}$ ,  $\bar{m}_{sav}$  are, respectively: average wages from WF, from MIF, increases in average wages and labor productivity, coefficients of average rate-salary payment for labor and quality of products, number of personnel at enterprise, profit per one worker, depending on  $j$  enterprise.

The amounts of the WF and MIF in this case are determined for each enterprise as follows:

$$WF_{j-\text{ent.}} = \bar{S}^{0}_{guar.} + \left( N_{\text{one for min.}}^{WF} \times \Delta P_{j-\text{ent.}} \times K \bar{S}_{j-\text{ent.}} \right) \times Ch_{ppp_{j-\text{ent.}}} \quad (4)$$

$$MIF_{j-\text{ent.}} = N_{\text{one for min.}}^{MIF} \times \Delta P_{j-\text{ent.}} \times K_{kach_{j-\text{ent.}}} \times \bar{S}_{mif_{j-\text{ent.}}} \times \bar{m}_{sav_{j-\text{ent.}}} \times Ch_{ppp_{j-\text{ent.}}} \quad (5)$$

Readers should not be confused by the presence in formulas (4) and (5) of the  $Ch_{ppp}$ , for according to the recommended methods for planning the increase in labor productivity (according to factor-arguments), the increase in the  $Ch_{ppp}$  leads to a reduction of labor productivity.

The methods we propose for planning the wage fund were tested in 1978 into VPO's of the USSR Ministry of the Petrochemical Industry—Soyuzshina (14 enterprises) and Soyuzkauchuk (15 enterprises), and in 1982—the Main Central Volga Construction Administration (15 enterprises), and also in intraplant planning when determining the wage funds for the various shops. The results showed the real technical possibility of utilizing the methods in any branch, and also the need for a significant redistribution of the wage fund among the enterprises and shops as compared to the existing method.

The peculiarity of the methods that are being recommended is the fact that the ratio between the dynamics of labor productivity and the average wages is not only the

result, as it is with the existing methods, but also the initial amount. At the beginning of the planning of the WF and MIF it is given primarily in the form of a normative which is the same for the entire totality of enterprises included in the ministry. The latter guarantees the observance of the given ratio not only in the plan, but also in reality for each enterprise. At the same time the increase in the average earnings per ruble of increase in labor productivity at the various enterprises will be differentiated depending on the change in the indicators used in the calculation. Thus if under the conditions that were investigated the normative for the increase in average wages per ruble of increase in labor productivity, which is the same throughout the ministry, was 20.6 kopecks, for individual enterprises this ratio ranges from 19.7 kopecks to 23.8 kopecks; the normative for the increase in wages from the MIF per ruble of increase in labor productivity was 0.38 kopecks, and for the various enterprises it ranged from 0.02 kopecks to 0.65 kopecks.

The proposed method for forming the GWF provides for a direct link between the increase in the wage and material incentive funds and the increase in labor productivity taking quality into account. In practice a change in the policy for the formation of the GWF and the method for measuring labor productivity in the direction of more complete accounting for the requirements of objective economic laws will contribute to strengthening the stimulating influence of the GWF on the growth of productivity.

The main recommendations presented in this article, in our opinion, could serve as a basis for this.

## FOOTNOTES

1. While recognizing the arbitrariness of such a definition of net output (the actual net output can be both actual and planned), the author was forced to use it since it is encountered in specialized literature also to make a distinction between it and the normative output.

2. See T. G. Kraykova, "Factorial Planning of Labor Productivity," VOPROSY EKONOMIKI, No 11, 1984.

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## Kaluga Turbine Plant Experience Emulated

18200191s Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 87 pp 180-188

[Article by Ye. F. Gavrilenko, candidate of economic sciences, docent of the Political Economics Department of the Tomsk Polytechnical Institute: "Following in the Footsteps of the Kaluga Turbine Plant?"]

[Text] Among the new forms of organization and stimulation of labor that have been discovered through practice an eminent place is occupied by the Novosibirsk

Experiment which began a decade and a half ago at the Elektrosignal Plant. The Novosibirsk Experiment is usually defined as a collective form of organization and payment for labor that is applied at levels higher than the brigade—in large production sections, technological flow lines, in shops, and, in the future—in productions and entire enterprises. (Footnote 1)

How precise is this approach? In order to clarify this let us try at least schematically to compare the Novosibirsk Experiment with the "Kaluga Variant." For the brigade form of organization and stimulation of labor (BFOST) as a qualitatively new system of organization of labor within the framework of the enterprise was formed first at the Kaluga Turbine Plant. Let us single out its main constituent systems. (Footnote 2)

1. Worker self-management, which provides for real participation of all workers in management at all levels: brigade—through the general meeting and brigade council; shop—through the council of shop brigade leaders; and plant—through the council of brigade leaders of the enterprise. Worker self-management, while developing creative initiative, directs it toward searching for optimal ways of fulfilling state plans.

2. Planning and evaluation of the work of local collectives (brigades) using the all-encompassing plan-evaluation unit—the brigade complement, which makes it possible to strictly evaluate the final results of all brigades and form their wage funds depending on the amount of this result. Moreover, one provides for complete correspondence between the collective earnings of the brigades and the contribution to the final result of the enterprise made by each of them.

3. Material incentives for workers on the basis of the labor contribution of the primary collective to the final result, using the coefficient of labor participation. This system of material incentives, by providing for correspondence between the earnings and the real labor contribution, contributes to increasing the labor activity of the workers.

On the whole, the "Kaluga Variant" of the BFOST is a most important element of the economic mechanism, but exclusively at the level of the enterprise. The branch and national economic mechanism not only lie beyond the sphere of influence of the BFOST, but also mark its external boundaries.

When comparing this "classical" variant of the BFOST with the Novosibirsk Experiment, in the latter one finds a principal distinction: "In order to determine the wage fund of the collective one calculates and establishes a long-term stable normative of payment per unit of output or work." (Footnote 3) The normatives of wages that are established by the enterprises (its subdivisions) "from above" are an element of the economic mechanism of the branch and national economic level.

Consequently, the Novosibirsk Experiment encompasses not only the economic mechanism at the level of the enterprise, as is the case with the BFOST, but also the branch and the entire national economy. I am convinced that the experiment in utilizing the normative of wages per unit of output in contract collectives working "by the Novosibirsk Method" and the problems that arise thereby (Footnote 4) should be taken into account more fully in developing a mechanism for applying wage normatives at enterprises.

There are also a number of particular differences between the BFOST and the Novosibirsk Experiment. Let us take a look at them. Let us begin with the block entitled "Worker Self-Management." Within the framework of the contract collective worker self-management is provided through the council of the flow line (section) which is headed by the senior foreman, that is, by an administrator. Of course it is very good if in such a situation the senior foreman is an informal leader, as was the case on the 11th Flow Line of the Ob' Association. (Footnote 5) But if not? In our opinion, the agency of worker self-management of the contract collective in principle cannot be headed by an administrative leader: for this is a violation of the very principle of worker self-management. Agencies of worker self-management—councils of sections and flow lines as well as brigade councils—should include workers (Footnote 6) and should be headed by workers. Of course, the chief of the flow line, the senior foreman should also participate in the work, but his voice should be only advisory.

This is also confirmed by the experience of the renowned brigade of V. P. Serikov. He thinks that the brigade council works most actively when it became "a council without a brigade leader," that is, when Z. P. Serikov stopped heading it. The fact is that although V. P. Serikov was called the brigade leader, his status was actually equal to the status of the section foreman. For there were 70 men—an entire section—under the direct supervision of V. P. Serikov, and he had to spend a good deal of time on organizational problems.

In my opinion, a correct formula for worker self-management within the framework of a large contract collective was found in the all-encompassing comprehensive brigade of Section 74 of the Sibelektromotor Association. (Footnote 8) This section with 79 workers services the automated line for producing mountings for electric engines. The comprehensive brigade includes six technological brigades of basic and auxiliary production (subsequently, in order to avoid terminological confusion we shall call the technological brigades teams). They include: two teams working on two shift on the automated line; a team of smelters on the mixer; a team for preparing fittings; a team of electricians; and a team of repair workers. The number of men on the teams ranges from 7 to 22.

The brigade council headed by the team smelter A. N. Altukhov includes six team leaders, an in order to provide for complete worker control (as one worker who



is a member of the brigade council told me) there are another six workers (one from each team). This council, working under the senior foreman of the section, A. I. Volodine, who has an advisory voice in the council, solves all principal problems of the section: the coordination in the work of the teams, the dissemination of advanced experience, the distribution of social benefits, personnel problems and discipline. And, finally, it establishes for the workers those coefficients of labor participation which they reach in their teams. And the section is controlled operationally by the senior foremen or the shift foremen.

Worker self-control is arranged in approximately the same way in the all-encompassing comprehensive brigade of the section of propeller rolling of Shop No 10 of the Tomsk Plant for Cutting Instruments. This brigade, which includes 45 people, works on two shifts. It receives round metal and produces a rolled drill for further processing. The brigade council, headed by the rolled metal worker G. I. Shadrina, consists of 10 people (five from each shift). It works with the senior foreman of the section, A. I. Cherkasskiy, who is included in the brigade council with an advisory vote. The brigade council handles problems of the production program, the admission of new members of the brigade, it announces increases in qualifications, it considers disciplinary issues, and it establishes the coefficient of labor participation for brigade workers. It operates fairly effectively when solving even the most delicate internal problems. For example, several years ago one adjuster was working in the brigade. He was a good specialist but he frequently was rude and out of line in communicating with other members of the brigade (by the nature of his activity the adjuster works with practically all of the machine tool operators). Because of this conflicts arose. Having weighed all the "pros" and "cons" the brigade council suggested that he be replaced. By a decision of the council another worker quickly mastered the complicated profession of the adjuster and began to serve the brigade. The former adjuster was demoted by a correct decision of the council and began to work as a metal roller, adjusting his own machine tools. He did not lose any wages and remained in the brigade, occupying a position that corresponded more to his character.

The brigade council can criticize the work of the senior foreman and not agree with his operational management decisions. For example, a year ago when the senior foreman permitted two workers of parallel specialties to work only on the first shift, which led to an overloading of the equipment on this shift and an underloading on the second shift, the brigade council, as the senior foreman himself put it, "chewed him out." The senior foreman did not act like an innocent leader, but recognized that he had been wrong and changed his decision, which did not take into account the brigade's interests. And because of this decision on the part of the foreman the conflict was easily eliminated.

Let us return to the Novosibirsk Experiment. As concerns the agency for worker self-management at the level

of the enterprise, in the Novosibirsk Variant it simply does not exist (I recall that with the BFOST this function is performed by the council of brigade leaders of the enterprise). And worker self-management at the local level of the contract section (brigade) certainly does not establish "automatically" a worker in a position of a real collective leader in the shop, not to mention the plant. This is confirmed by the results of questionnaires. Among the workers 60-70 percent say confidently that they feel that they are the masters in their own positions and can exert a significant influence on the policy and organization of their work. But even within the framework of the shop, only 25 percent of the workers have a sense of their actual influence, and within the framework of the enterprise—only 15-20 percent. It must be emphasized that this questionnaire was conducted among workers of a highly developed scientific-industrial production where the proportion of people who perform social work on the scale of the shop and enterprises is higher by a factor of 1.5-2 than it is in other productions. (Footnote 9) But even the sections of workers in public activity at the level of the shop and the enterprise are still insufficient for establishing the feeling of being a master in them.

Consequently, further development of the Novosibirsk Experiment requires improvement of the system of worker self-management and the creation of agencies for worker management at the level of the enterprise as a whole. In our opinion, this should be an agency that is analogous in its role and functions to the council of brigade leaders of the enterprise under the conditions of the BFOST.

Now about planning. Under the conditions of the BFOST the planning and evaluation of the work of local collectives on the basis of brigade complements makes it possible to raise intraplant planning and management to a qualitatively new level. The fact is that both worker self-management and material incentives for workers rely largely on the system of planning and evaluation of the work of the brigades. Thus if the evaluation of the work of the entire local collective, "falters" and, correspondingly, the collective wage fund for the brigade incorrectly reflects its labor contribution to the final result of the shop or enterprise, then one can hardly consider any determination of this fund within the brigade according to the coefficient of labor participation, even the "fairest" one, to be correct. Like the central unit of management, planning also becomes a most important area of worker self-management. Without participation in the planning and evaluation of the work of the brigades, worker self-management ends up severely truncated. Distribution relations and distribution of earnings within the brigade are a much less important part of worker self-management.

But under the conditions of the Novosibirsk Experiment intraplant planning changes little. As the director of Elektrosignal, F. F. Shevelev, recognized, only now, 14 years after the beginning of the experiment, are they

trying in the plant to radically restructure planning so that cost-accounting indicators can be planned for contract collectives." (Footnote 10)

Understandably, it is difficult to restructure planning when only individual sections are on contracts. Therefore the changeover of all sections of the enterprise to the contract and the restructuring of intraplant planning on the basis of an all-encompassing planning-evaluation unit (the brigade complement, the section complement) is the most important reserve for developing the Novosibirsk Experiment.

An unquestionable merit of the Novosibirsk Experiment is the close "linking" of shop engineering and technical personnel to the contract, right down to including them in contract collectives. Thus one solves one of the painful issues of the contract—its engineering support. This is especially important in those branches where the technical level is high and the shop engineering and technical personnel, because of technological necessity, are forced to participate more extensively in the labor process along with workers, and, correspondingly, their activity goes far beyond the framework of administrative. There engineering and technical personnel should be included directly in brigades without any question. If this is not done, as is shown by the experience, for example, of one of the subdivisions of the Tomsk Petrochemical Combine, the shop engineering and technical personnel are not very interested in introducing the BFOST or in the final result of the work of the contract brigades, even though they exert an essential influence on it. The fact is that according to existing provisions the engineering and technical personnel receive a bonus only under the condition of the fulfillment of the plan by the production as a whole, and so far this does not happen frequently. But the brigades are responsible only for the results of their work and therefore the workers received bonuses (complete or partial) even if the production does not fulfill the plan. Thus engineering and technical personnel lose material interest in the work (there is no bonus, and you will always receive your salary), and their attitude toward labor and personal responsibility deteriorate. The chief of the polypropylene production, A. Ya. Korbut, thinks that only one-third of the assignments received at operations conferences are fulfilled by engineering and technical personnel. In the end many specialists with higher education take labor positions. Now, with a significant shortage of engineering and technical personnel at this enterprise, more than 120 engineers are working in labor jobs. And the shortage of qualified engineers and their incorrect utilization undoubtedly also has a negative effect on the final production result.

As concerns general plant services, here the optimal method for including engineering and technical personnel and the BFOST is to create local collectives (brigades, divisions, bureaus) from engineering and technical personnel and employees using the same principles that are used for workers but, of course, taking into

account the specific features of the labor of engineering and technical personnel. This is the path that is now being taken, for example, by the Kaluga Turbine Plant.

In contract collectives that are working under the conditions of the experiment, they try to make material incentives for engineering and technical personnel directly dependent on their personnel labor contribution to the final result of the local collective. But only one method is used to solve this undoubtedly correct problem: the engineering and technical personnel included in the contract collective are given a coefficient of labor participation according to which all salaries and incentives coming from above are distributed. How justified is it to use the coefficient of labor participation in order to evaluate the labor contribution of engineering and technical personnel to the results of the work of a contract collective?

In the first place, workers and council members of a contract collective that has coefficients of labor participation are far from always able to evaluate correctly the intelligence of various decisions coming from engineering and technical personnel. Perhaps the workers can immediately see either clear mistakes or clear activity (for example, if the engineering and technical personnel spend part of their time in the workplace. But the long-range consequences of any engineering and technical decision can be evaluated correctly only by another highly qualified specialist. Understanding all this very well, the engineering and technical personnel in the contract collectives act accordingly. For example, according to the authoritative opinion of P. Muravlev, the head engineer of the Elektrosignal Plant, technologists have not begun to work any better in contract collectives. For their main duty is to work for the future and to introduce new technical equipment and technology. Improvements cannot be seen here. Basically the shop technologists are interested in solving current, operational problems, since their earnings depend directly on these. Moreover, they spend a great deal of time directly in the work places. (Footnote 11)

In the second place, with a well-arranged system of planning, the final result of the contract collective to a significant degree objectively characterizes the work of the engineering and technical personnel included in it (without intelligent engineering and technical and management decisions it would hardly be possible to provide for the achievement of substantiated indicators of the reduction of labor-intensiveness, higher labor productivity, and so forth).

In the third place, when evaluating engineering and technical personnel one should undoubtedly take into account the opinion of the contract collective and its council, but the higher managers should not place on the shoulders of the work collective the control of the engineering and technical personnel that are included among them.

Taking all this into account it would be more correct to use the system of incentives for engineering and technical personnel who are included in contract collectives whereby, say, half of their bonuses are formed for subsequent distribution taking into account the coefficient of labor participation; and the other half would be directly linked to the final results achieved by the collective. And, as was already said above, one should take into account the evaluation of the work of the engineering and technical personnel that is provided by higher managers who are not in the contract collective.

In the Novosibirsk Experiment the coefficient of labor participation plays an important stimulating role—it helps to educate the workers through the ruble and to increase their labor activity. But in contract collectives the differentiation of labor participation and its influence on earnings turn out to be appreciably less than is recommended by scholars. (Footnote 12) It is considered to be an indisputable truth that the harder you “hit” a person with the ruble as through greater differentiation of the coefficient of labor participation, the more quickly he will shape up and begin to work better. But, in our opinion, this is a deception. And the workers themselves apparently sense this and thus they “smooth out” the differentiation of the coefficient of labor participation. The attitude of the workers and also the lack of the proper objective criteria for differentiation of the coefficient of labor participation also explain its insignificant amount of differentiation and the equalizing tendencies.

One comes to these ideas by comparing the two variants of collective labor organization—Kaluga and Novosibirsk. Judging from everything, even the initiators of the Novosibirsk Experiment, as the BFOT has developed, are still considerably behind the country's leading enterprises in this respect. And the main reserve for increasing the effectiveness of the experiment is its consistent implementation and the development in contract collectives of all the most important constituent parts of the brigade form of organization and stimulation of labor that have been most fully expressed at the Kaluga Turbine Plant.

#### FOOTNOTES

1. “A Second Breath for the Contract,” EKO, No 1, 1986, p 91.
2. Here and henceforth the author uses data for the Kaluga Turbine Plant obtained during a scientific business trip in 1984.
3. Kutyrev, B. P., “Joining Individual and Public Interests,” EKO, No 1, 1986, p 94.
4. “The Novosibirsk Experiment. Results and Prospects,” SOTSIALISTICHESKIY TRUD, No 2, 1986, pp 83-84.
5. EKO, No 2, 1986, p 115.

6. The brigade leader is first of all a worker and only after that an administrator. It has been established that the brigade leader should spend no more than 25 percent of his working time on solving organizational problems, and the rest of his time should be spent on performing the functions of a worker. (See SOTSIALISTICHESKIY TRUD, No 8, 1984, p 50).

7. EKO, No 12, 1985, p 113.

8. Here and henceforth the author will give data obtained by him at enterprises of Tomsk during consultations and conversations on questions of the BFOT.

9. Gordon, L. A., and Nazimova, A. K., “Technical Progress and the Social Development of the Working Class,” VOPROSY FILOSOFII, No 7, 1984, p 34.

10. EKO, No 1, 1986, p 110.

11. SOTSIALISTICHESKIY TRUD, No 2, 1986, p 82.

12. As B. P. Kutyrev correctly notes, “the mechanisms that are applied for forming and distributing earnings are especially conservative.” (EKO, No 1, 1986, p 105).

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#### Collective Contract Discussion Continues

*18200191t Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 6, Jun 87 pp 189-194*

[Round table discussion led by V. A. Starovoytov and L. V. Vorontsov, Novosibirsk Oblast Trade Union Council, and Candidate of Economic Sciences B. P. Kutyrev, “The Collective Contract Continues To Raise Questions”; first paragraph EKO introduction]

[Text] The experiment on the application of the collective contract in large structural subdivisions of associations, enterprises, and organizations of industry, construction, transportation, agriculture and consumer services is continuing for the fourth year in Novosibirsk Oblast. The first subdivisions, which entered it in 1984, are being joined by new ones today. But both the veterans and the “newcomers” still have a number of questions. The magazine's editorial staff and the oblast trade union council invited chairmen of trade union committees and workers representing the experimenters to discuss some of them. From the oblast trade union council the discussion was led by V. A. Starovoytov and L. V. Vorontsov, and from the magazine—Candidate of Economic Sciences B. P. Kutyrov. We shall give a brief version of the discussion.

At the meeting of the Bureau of the Party Obkom that was devoted to the experiment in June 1986 the first secretary, Aleksandr Pavlovich Filatov, raised the question directly: has the spreading of the collective contract not slowed up, and if so, why? Participants in the round table discussion tried to answer this question. First of all, it should be noted that not all the conditions of the experiment have been observed, including one of the most important ones—the conclusion of a contractual agreement between the collective and the administration.

Two shops of the Elektrosignal Plant were officially included in the experiment. But during past years the collectives and the administration never reached an agreement, and there can be no contract without this. What was the stumbling block? The normatives of the number of personnel by which the normative of the payment per unit of output is determined. Let us say, for example, that according to the normative there are 12 mechanics in the shop but in reality there are five. Which of the two figures should be included in the normative? The administration insists on the second and the collective—on the first. One can understand the administration: the seven nonworking mechanics have already been reflected in the savings on wages for the plant. The evidence of the shop workers is also understandable: everywhere else in similar situations they employ 10 people, so why should they have to make do with fewer personnel? For the payment is arranged according to labor. If you do more work, you should earn more money.

Those in attendance alluded to the fact that one should settle on a compromise figure. For both sides lose because of the lack of agreement. And on the whole it is impossible to approach an agreement this way. Initially both sides should have advanced not only the extreme conditions (12 and 5), but also a compromise (say, eight mechanics). A month is allotted for the debates. And if they do not reach the extreme conditions the agreement will include a compromise that goes into effect for the period the agreement is in effect.

During the course of the discussion they recalled cases in which the normative for payment per unit of output was administratively revised as too "fat," and not providing for the given ratio between the rates of increase in labor productivity and wages. They explained to the section collective the need to revise the calculation and persuaded them not to make trouble. But the condition of the experiment relating to the long-term effect of the normative was not observed, or at least they did not include in the agreement the point concerning inevitable revisions, or more precisely—recalculations because of changes in organizational-technical and economic conditions. On the whole, with the normative approach to the calculation of wages, their planning, and their formation, not everything was well. There was a reluctance to consistently follow this approach both on the part of the administration and on the part of the rank-and-file workers.

Many agreements included in the contract leave something to be desired from the standpoint of the clarity of the establishment of the rights and responsibilities of the parties. Thus in the Voskhod Bread-Baking Association there were complaints from the brigade collective about the fact that the administration was not automating the lubrication of forms even though in the text of the agreement concerning this this point was included as mandatory. But the administration is not doing much of what it is supposed to do, including outside the experiment. What is wrong with the provisions? The responsibility for the failure to fulfill them. The lack of indications of this responsibility and the agreement is frequently explained by the notion that in a number of cases, for example, in natural disasters or interruptions of material and technical supply, all the administration can do is throw up its hands: what do they want from it? But the task of the agreement is to determine the duties and the real capabilities of each contracting party and within this framework determine the requirements and the demands. Certain approaches to this understanding of the role of the contracts are demonstrated by the Novosibirsk Chemical and Pharmaceutical Plant. Incidentally, at the plant they have found a solution in a situation similar to the one described above concerning the mechanics.

A number of questions are still unclear today even to people who have not entered any agreements. For example, what should be done about overtime work under the conditions of the collective contract? Outside of it everything is understandable: there are normative documents and certain rights and tasks of the trade union committee are well known. But here on its own initiative the section under contract loses some of its workers. As a result it is necessary again voluntarily, without instructions from the chief, to work evenings for otherwise the plan will not be fulfilled. We must emphasize the word "voluntarily." Is this considered overtime work? Can the trade union be called on the carpet because there was no permission? Should they be paid as is established by the law? The answers from those in attendance turned out to be contradictory. This was partially because they had not thought about such issues before (3 years!) and interpreted them in a traditional way, even though a new approach was required.

They finally came to the conclusion that it is necessary to recognize the changes made by the conditions of the collective contract. The collective can on its own initiative exceed the normal working time without acquiring permission and without demanding additional wages. It can turn to the administration with a request or independently hire the necessary working hands (for example, if a flu epidemic has "taken out" a considerable number of workers from their ranks), but this payment must come from the wage fund for the products that are produced or the work that is performed. The existing provisions concerning overtime work go into effect if the normal working time is exceeded on the initiative of the administration. The role of the trade union committee in

all cases is not to allow excessive fatigue, or premature loss of the ability to work by members of the contract collective in their drive for earnings.

As before, as in relations with brigades, the spreading of the collective contract is impeded by the imperfect mechanism for distributing wages according to the coefficient of labor participation—KTU. As before, the KTU is calculated subjectively and arbitrarily. The method of objectified normative evaluation proposed by the Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences is simple, accessible, and it prevents conflicts, and it was easily assimilated at the chemical and pharmaceutical plant, and the Ob' Leather Footwear Association, but it did not become widespread because of pressure from advocates of the established method who still dictate their own provisions to the production workers.

A lively discussion was evoked by the question of who should evaluate the contribution according to the KTU of the senior foreman who is in charge of the section, or the shop chief. Generally, those in attendance were sincerely surprised that such a question could exist. They had been convinced previously that the decision would be made by the shop chief or the first manager of the association, enterprise or organization. At the round table it was difficult to convince them of the lack of logic in this. The contract collective disposes of the resources for production and the results of their activity in the form of wages, and it is well aware of who has made what contribution to these results, so it should also evaluate the contribution of its leader. Why should there be intervention from above?

An objection arose: the senior foreman or the shop chief do excellent work for the collective but they cause harm to the higher subdivision or enterprise as a whole while in the collective they receive a high KTU. Such a course of discussion, however, comes from an incorrect understanding of the essence and conditions of the collective contract, particularly the mechanism for evaluating the activity of the collective according to the final results. The wage fund should be formed taking into account the significance of the collective's activity for the higher subdivision or the enterprise. If a senior foreman or shop chief has worked poorly from these standpoints the entire section or shop will receive small earnings and the KTU of the shop chiefs will be correspondingly small, but not because this was decided by the higher ups but in keeping with the methods accepted by the collective. The situation is analogous with good or excellent work.

The Morskoy Sovkhoz tried to evaluate the activity of the engineering and technical personnel of contract shops at the level of the ministry. There they came to the conclusion that the managers and engineers of the shops had begun to receive "too much," "unjustified" additions to wages, although they did not replace workers, that is, they did not work with their hands. Yet the

success of the shops in their activity is closely linked to the intellectual efforts of the specialists. But, in the opinion of the representatives of the ministry, the work of the head should apparently not be rated so highly....

Those in attendance jointly came to the conclusion that the existing mechanism for distribution according to the KTU impedes the expansion of democratization. How do they remove the barrier? The first thing is to develop the method proposed by science and approved by the AUCCTU which makes it possible to calculate the contribution of each, knowing ahead of time what the payment for various actions of members of the collective means in the KTU. In the second place, it is necessary to increase the role of the trade union group organizer and the chairman of the trade union committee in the councils of the contract collectives. They considered the proposal to introduce for them the right to veto decisions concerning distribution according to the KTU. The proposal was rejected: not because it was in principle unacceptable but because of the reluctance of trade union activists and leaders to solve this problem intelligently and democratically. It is necessary to increase the role of divisions for labor and wages in the course of the development by collectives of mechanisms and provisions for the KTU.

We live in an age of experiments. Each carries with it new conditions for management. This pertains also to those who experiment on the collective contract. How does one reduce and separate, for example, the conditions for the large-scale experiment with the application of the collective contract? The Novosibirsk Instrument Plant practiced both of these during all of 1985 but nobody could draw any significant generalizations or recommendations for others concerning this. (Footnote 1) A concrete question: the Barabinskoye Locomotive Depot of the Western Siberian Railroad is changing over to the collective contract. At the same time the Ministry of Railways is "introducing" the experiment of the Belorussian Railroad. How does one combine the two methods which on the whole are far from coinciding in all ways: most likely it is best to limit themselves to the Novosibirsk Experiment.

Here is a key point that came from the discussion. According to the decree of the CPSU Central Committee, the USSR Council of Ministers and the AUCCTU concerning improvement of the organization of wages, increased wage rates and salaries are introduced through internal reserves of the enterprise. Most frequently in order to increase the wage rate or salary for three people, it is necessary to eliminate one. The process of reducing personnel, as everyone knows, is extremely painful. Instead of this it would be more expedient to introduce a collective contract—a method for more flexible implementation of the tasks indicated in the decree, one that is economic and not administrative.

All those present were interested in the question of changes in many aspects of the activity of enterprises and their position in connection with the application of the

collective contract. For example, the fifth category is established for a loader for the distribution of earnings. In the unified wage rate-qualifications guideline there is no such category for this profession. Is the collective violating the normative act or not?

A locomotive mechanic has made a mistake and a commercial train has been wrecked. Should the chief of the depot and the railroad division be responsible for this occurrence as they were before? They have performed their duties, and the violation was committed within the framework of the contract collective at a lower level.

The collective had a right to invite an outside specialist under the agreement, and he is the one who had the accident. What kind of responsibility is there and who bears it? Who makes compensation for the damages? The administration or the collective?

There are many questions and few answers. But frequently they look for the answers above—in the departments, in their normative acts, while in reality they are right at hand, right next to them. Today by the law the collectives have immense authority. Frequently they do not know what to do with it. The answer is simple: introduce the collective contract and other the conditions described in the decree of the USSR State Committee for Labor and Social Problems and the AUCCTU Secretariat concerning the Novosibirsk Experiment of 25 November 1983. (Footnote 2) Not only for those in attendance and those who spoke at the round table, but also for all who apply and introduce the collective contract, there should be a single piece of advice—not to retreat or return to these conditions! Unfortunately, the experimenters frequently do not swerve from them.

#### FOOTNOTES

1. See, for example, "The Shop Under Contract: Experience, Problems, Research," *EKONOMICHESKAYA GAZETA*, No 13, 1986, p 7.

2. See Bulletin of the USSR State Committee for Labor and Social Problems, No 4, 1984.

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#### Investments Related to Technical Progress

18200191u Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87 pp 194-206

[Article by S. A. Smirnova, candidate of economic sciences, Institute of World Economics and International Relations of the USSR Academy of Sciences (Moscow): "Technical Progress and Investments"]

[Text] In the leading capitalist countries, the 1980's are associated with the "microelectronic revolution" which has become a symbol of the developing technical re-equipment of industry on the basis of new generations of technical equipment. Yet at the beginning of the current decade many economic problems were aggravated and the inequality of the development of the leading capitalist countries became greater, which was largely conditioned by differences in the intensity of the restructuring of their economies. (Footnote 1)

The alignment of forces in the capitalist world and the prospects for growth of the scientific and technical potential depend significantly on the dynamics and structure of accumulation in industry. An analysis of the investment process, in our opinion, sheds light on many important aspects of the modern economic position of the United States, Japan, and the FRG.

#### The Dynamics of Accumulation

Since the beginning of the 1970's the process of accumulation in the leading capitalist powers have been characterized by less dynamism than in the 1960's as well as a strongly expressed instability. During 1970-1985 the average annual rates of increase in capital investments in the economy decreased to 0.6 percent (FRG) and 3.7 percent (United States) as compared to 4.4 percent (United States) and 14.9 percent (Japan) during the 1960's. Moreover, the processing industry for the first time became a less attractive sphere for capital investments and the rates of increase in capital investments here began to drop more sharply than in the economy as a whole: 0.7 percent (FRG) and 3.4 percent (United States) on an average for 1970-1985, and 6.1 percent (the United States and FRG) and 14.7 percent (Japan) during the 1960's.

The condition of the investment process in these countries reflects an essential flowing up of the rates of economic growth, increased inflation, fluctuations in the currency rates, a sharp increase in costs of the main energy sources, and so forth. Taken together these phenomena have worsened the financial condition of firms and the possibilities of investment. Thus inflation has undermined the significance of amortization deductions in expanded reproduction. At the same time there has been a destabilization of the role of an other important source of financing accumulations—profit, since the profit norm (the ratio between gross profit and the full cost of fixed capital) has dropped: during 1973-1982 in the processing industry of the United States—from 18.5 to 10.6 percent, Japan—from 32.4 to 20.7 percent, and the FRG—from 16.5 to 11.7 percent.

The lack of correspondence between the branch structure of production formed by the middle of the 1970's and the new price ratios for the basic resources, the changed structure of consumer demands and the keener competition on the world market, on the one hand, gave rise to investment stagnation and, on the other, it brought with

it an objective prerequisite for stepping up accumulation. Additional stimuli for its activation appeared because of the new directions of scientific and technical progress. A special role here is played by microelectronics which caused a "wave of innovation" in industry of the United States, Japan, and the FRG. The new technical equipment not only transforms the structure of the investment demand (mainly for machines and equipment), but also gave rise to dynamically growing areas of consumer demand (the rapid increase in the sales of video equipment and personal computers). Progress in electronics provided a powerful impetus for modernizing the production apparatus of many spheres of the economy and expanding the production capacities of branches participating in the radical updating of the material and technical base.

But the technical reequipment and the restructuring of the investment process that is conditioned by it are being carried out under the influence of both stimulating and impeding factors: these are the possibilities of scientific and technical progress and the aggravation of the contradictions of capitalist reproduction. Technical progress under capitalism is not a goal in itself and not a panacea for all economic "woes"; it is always accompanied by a tendency toward stagnation. One of the convincing manifestations of this during the 1970's-1980's was the threat of bankruptcy (or complete bankruptcy) of the largest companies in the leading branches of industry, for example, the Chrysler automotive company (United States) and the AEG Electrical Equipment Company (FRG). Moreover, because of the lack of a strategic technical policy, entire branches ended up in a condition of structural crisis. Thus in many countries the metallurgical companies did not promptly take into account the directions of technical progress in the consumer branches and did not restructure themselves for producing new materials. As a result there was a sharp reduction in production, workers were released, and certain industrial regions became poverty zones.

The alternation of tendencies toward updating and stagnation gives the investment process an impulsive character which is amplified by the cyclical nature of economic development. Thus with generally high rates of increase in investments during 1970-1985 there were cyclical "splashes" in which during certain years capital investments in the processing industry increased by 14 percent (the United States, FRG)—20 percent (Japan). But mainly the differences between the countries and the dynamics of accumulation during this period were conditioned by the lack of correspondence in time and the different speeds of technical reequipment.

During 1970-1985 the production capital in American industry as a whole was updated more intensively than in Japanese and West German industry (mainly as a result of the more active investments during 1970-1980). In the middle of the 1970's American companies (previously Japanese and West German firms) began to restructure industry. They were forced to do this by the

fact that during the 1960's and the beginning of the 1970's they lost a considerable proportion of the domestic and foreign markets to other countries, and not only in the textile, sewing, and footwear industry, but also in the basic branches—ferrous metallurgy, automotive construction, and machine tool and household electronics production. Moreover, it was necessary to adapt to the high level of prices for energy after the energy crisis. The adaptation was facilitated by the rapid drops in the prices of microelectronics and the general slowing down of the growth of prices for machines and equipment beginning in the middle of the 1970's.

The economic advantages of the new technical equipment were manifested quite obviously at the end of the last decade. At that time Japan began to rapidly increase investments in the processing industry. During 1978-1984 capital investments increased by an annual average of approximately 11 percent (rates typical of the period of the investment boom of the 1960's) while in 1970-1978 in Japan they decreased (-3.9 percent) and more sharply than in the FRG (-3.0 percent). But on the average for 1970-1985 the average annual rates of increase in investments amounted to about 3 percent. Japanese firms (as distinct from West German ones) were constantly increasing their share in world capitalist production and exports because of the competitiveness of automotive construction, radioelectronics, shipbuilding, and metallurgy. In spite of the success of foreign economic expansion, they correctly estimated the turning point in the dynamics of the demand—the saturation of the market with products from these branches. The expansion of capacities within the previous branch structure inevitably gave rise to a surplus of them, a significant underloading of the production apparatus, and a reduction of profitability. Japanese entrepreneurs tried to avoid or to diminish these negative consequences by deliberately slowing up the investment activity in the traditional spheres.

The flexibility and mobility of Japanese concerns are clearly manifested in the fact that, being in relatively more favorable conditions than in the United States and the FRG, they nonetheless sharply changed their investment policy and began to resolutely reduce the production apparatus in certain sectors. At the same time in all branches (both traditional and science-intensive ones) there is an active search for new areas for the application of capital. In particular, metallurgical companies are rearranging their activity and delving into the production of materials for electronics, new kinds of ceramics, and optic fibers. According to estimates of the managers of 200 of the largest companies (1984), Japan has gained the lead in robot equipment and is on a level with the United States in electronics and technological equipment.

West German industry is now reaping the fruits of a more conservative (as compared to the Japanese) scientific and technical policy, which was formed during the 1950's-1960's when monopolies were oriented not so



much toward "technological breakthroughs" as toward constant improvement of existing technologies and products. But maintaining such a strategy during the 1970's led to a situation where the FRG, while lagging behind in the latest branches, at the same time lost its positions in the market for many consumer goods, having encountered strong competition from countries with inexpensive work force. The sharp increase in costs of petroleum seem to have culminated the period in which the branches that produce metals, chemicals and other materials played the role of motive forces for economic development of the country. All this slowed down the growth rates of industry and significantly reduced the proportion of profit in circulation.

In this situation considerations of financial stability in West German monopolies turned out to be stronger than the desire for economic expansion on the basis of production accumulation. Thus even one of the largest, technically advanced electrical equipment concerns "Simmons" incomes from operations in the market for ship capital were almost twice as great as incomes from the basic activity. For several years the concern invested almost no profit in production. Only after it was faced with the threat of increased taxation did investments begin to grow. This example sheds some light on the reasons for the sluggish accumulation in the FRG.

The deep investment stagnation gave rise to pessimism ("technological backwardness") or at best indeterminacy ("decline or another rise?") in the evaluations of the prospects for this country's development. In 1978 investments in the processing industry in the FRG began to increase, but in 1985, according to preliminary data, their volumes (in permanent prices) did not exceed the 1970 level. For more than 10 years the country was unable to get out of the vicious circle: the reduced profit made it impossible to undertake extensive technical reequipment of industry and updating of its structure, and without this, in turn, it was impossible to accelerate growth, increase profit and energize the investment process. But even in the 1970's there was a stratification of West German industry, and in certain of its spheres there was a deep restructuring. The general breakthrough began, perhaps, in 1985, when capital investments increased, according to preliminary estimates, by 14 percent. It is typical for the FRG to have an alternation between periods of inadequate "technological dynamism" and quantum leaps in the introduction of the latest technical equipment. Taking this into account, one can assume that in the second half of this decade, it was quite probable that there would be an investment upsurge (an increase by an average of 6.5 percent per year), which was promoted by the preceding significant investments in the development of the latest technical equipment and the potentially large demand for updating production apparatus on the basis of information equipment and modern means of automation and communications.

Technical reequipment of industry, as we see, proceeds irregularly and increases the differentiation even in the

leading capitalist countries. Before the beginning of the 1980's the United States on the whole outpaced its competitors in the intensiveness of accumulation, having thus created prerequisites for the next "technological burst." But Japan's positions in a number of areas of scientific and technical progress and the speed with which it has been updating its industrial apparatus during the past 5 years make U.S. superiority unstable or in any case not unquestionable.

### Structural Reorganization

With the changeover to the new generations of technical equipment beginning at the end of the 1970's it became especially important to analyze the structure of the cumulation. The overall dynamics of industrial investments conceal the real picture of the intensiveness of technical reequipment and its main directions and spheres.

An important feature of the modern renewal of the production apparatus is that it takes place against the background of a sharp retardation of the rates of economic growth and the impossibility of providing for the same high norm of accumulation as in the 1960's. The investment policy under these conditions is determined by the desire to utilize limited resources efficiently. As a result, they are revising the proportions of reproduction; the proportion of investments in expansion of production capacities is decreasing: by the beginning of the 1980's it was 29 percent (Japan)—39 percent (FRG, United States); most of the capital investments go for streamlining and replacing outdated production apparatus on the basis of more productive technical equipment (at the same time, according to certain estimates, one achieves a 2 percent increase in capacities).

While industry as a whole is generally oriented toward investments in modernization and streamlining, the situation is different in individual branches. Two types of investment processes exist in parallel.

The first—sluggish accumulation, relying on the replacement of outdated fixed capital and at the same time reducing production apparatus in certain branches—is typical of traditional productions. During 1978-1980 14 branches eliminated from 10 percent (the production of polyester) to 55 percent (the production of aluminum) of their capacities. Other countries are taking this path more slowly. For example, the FRG has limited itself to preserving the production apparatus (at the level of the beginning of the 1980's) of critical branches—ferrous metallurgy and shipbuilding. The United States has insignificantly reduced the capacities in ferrous metallurgy (8-9 percent) and petroleum processing (4 percent).

Japan was next to demonstrate increased flexibility and the mobilization of capital for technical reequipment of industry by refraining from maintaining surplus capacities and redistributing funds to the more promising

spheres. Thus the most competitive companies frequently compensated for the reduction (by 37 percent during 1978-1982) of capacities in shipbuilding. For firms that curtailed production the value of the shares was paid from a fund formed from state subsidies, payments from "surviving" corporations and incomes from the sale of land on which the dismantled shipyards were located. In the opinion of Western economists, if the shipbuilding companies had taken the path of price competition, its consequences would have been destructive for the branch as a whole. The destruction of certain firms would have been combined with the weakening of others that were doing better. The agreement reached by the entrepreneurs (with the participation of the state) to improve the branch made it possible for the less competitive companies to maintain their capital and begin activity in new branches.

The second type of investment process—dynamic investment mainly in new capacities—is typical of science-intensive branches on which technical reequipment of the economy as a whole depends. While capacities have decreased or increased slowly in the traditional branches, during the 1980's a considerable part of the capital investments were used for expansion in science-intensive spheres: in the United States—up to 60 percent in electrical equipment and general machine building (including computer production) and up to 68 percent in instrument building; in the FRG—up to 45 percent in electrical equipment and up to 99 percent in computer production. As a result, the proportion of machine building in the FRG and Japan reached approximately 43 percent of the investments in the processing industry, and in the United States—39 percent (at the beginning of the 1970's it was no more than 36 percent in these three countries).

A growing competition of capital investments in branches that create means of labor was noted also in the 1960's, being one of the mechanisms for replacing live labor with embodied labor. But the priority of machine building (especially in Japan and the FRG, where this sector determines their international specialization) became stronger precisely under the conditions of limited investment resources and the incipient radical technical reequipment. The change in directions of scientific and technical progress is only indirectly reflected in the branch redistribution of capital investments. It is more evident in the change in the structure of newly acquired means of labor. The proportion of machines and equipment in the 1980's reached 75-80 percent in investments of the processing industry and then stabilized. But concealed behind this were important changes in the active part of the production apparatus. By the beginning of the current decade (as compared to the beginning of the 1970's) in the cost of new equipment there was a decrease in the proportion of technological equipment (to 27-31 percent) and means of transportation (to 22 percent), but there was a significant increase in the proportion of electrical equipment, office and computer equipment, and means of communication (up to 40

percent as compared to 20-25 percent at the beginning of the 1970's). The new technical equipment rapidly became widespread in spite of the sharp reduction of economic growth.

The competition forces producers always to update the production apparatus and the products that are produced. But today this mechanism is in need of additional stimulation since the time periods for the development and introduction of innovations have decreased appreciably (Japanese firms, for example, proceed from the idea that equipment will be obsolete in 5 years). At the beginning of the 1980's the government in the United States, as, incidentally, in other countries as well, again reduced the time periods for writing off industrial equipment—from 8.6 to 5 years, and the state is providing more assistance in automation of production. Monopolistic capital itself is adapting.

A positive role in the acceleration of technical reequipment (particularly computerization) of the economy is played by a new sphere of activity that is related to the rental form of equipment use—leasing. The cost of the leased equipment (mainly computers, office equipment and means of transportation) is from 8 percent (FRG) to 20 percent (United States) of the capital investments in the economy. Being a concealed form of credit, leasing makes it possible for the entrepreneurs temporarily to shift investment expenditures to the companies of this relatively new sphere of activity. Equipment rental is more advantageous than traditional credit and not only solves many financial problems but also reduces the risk associated with the assimilation of new technical equipment, which is especially important for small and medium-sized enterprises.

Another form of mobilization and redistribution of investments for the development of the newest branches are the funds for risk capital which are formed by large corporations, independent organizations, and government departments for financing innovative undertakings. In the middle of the 1980's in the United States there were about 500 of these funds. Recently the amounts of the risk capital are increasing in many countries. But so far only in the United States does it play a role in accelerating scientific and technical progress and updating industry, especially in biotechnology and electronics.

### The Effect of Restructuring

The new technical content of the investment flows and the priority of updating machine building create prerequisites for increasing the effectiveness of accumulation. The very nature of modern technical progress includes the possibility of relative savings on capital expenditures when modernizing industry. A well-known example of capital-saving equipment is microelectronics, whose prices have dropped severalfold in recent years with a simultaneous improvement in their parameters. Microelectronics has opened up new horizons for automation

of production, as a result of which the productivity of equipment is increasing by a factor of 2-3 and product quality is improving sharply. Automation makes it possible to take changes in demand into account more flexibly and to utilize working time more flexibly. A precise evaluation of the volume of output makes it possible to reduce production supplies (in certain Japanese firms—by 80-90 percent) and, consequently, also the need for circulating capital and investments in warehousing.

A savings on capital expenditures is also provided as a result of the reprogramming of the corresponding equipment, for example, robots. Moreover, the effect from investments in means of electronic automation is reflected in the increased labor productivity in the basic production operations (by 40-70 percent) and the reduction of expenditure on payment for labor (by 5-20 percent). The application of computers makes it possible to control more strictly the utilization of all resources (including fixed capital) and as a result it increases the effectiveness of traditional technological equipment, which is extremely important under the conditions of unstable economic growth.

Electronic automation is one of the main directions of technical reequipment of the economies of the leading capitalist powers. Its multiplanar effect is seen fairly clearly at the level of the most dynamic firms, but so far it is not being manifested in the processing industry as a whole. The restructuring of the entire branch is a more lengthy process. The level of its capital-intensiveness will be determined for a long time by the production apparatus formed by the end of the 1970's. Because of the sluggish investment process in the FRG, for example, the proportion of the latest equipment (up to 5 years of age) by 1983 had dropped to 36 percent (1960—56 percent, 1970—42 percent). The lower level of capital-intensiveness of new means of labor still does not have much of an influence on the overall indicator. The movement of the actual capital-intensiveness thus conceals the capital-saving effect of the new technical equipment.

Average Annual Rates of Increase of Capital-Intensiveness in Processing Industry,

Years	United States	Japan	FRG
1960-1970	-1.0	1.0	1.4
1971-1985 (estimate)	0.5	2.6	1.2

The average annual rates of increase in capital-intensiveness (Footnote 2) in the processing industry are given in the table. Capital-intensiveness is directly influenced by the level of loading of production capacities. In 1976-1984 it was steadily lower than in 1968-1975; in the United States—79 and 82 percent, respectively, Japan—91 and 96 percent, and the FRG—89 and 91 percent.

The real productivity of means of labor is characterized more precisely by the indicator that purges it of fluctuations in the loading of capacities, which can conventionally be called the potential capital-intensiveness. According to our calculations, in the processing industry it is approximately 20 percent higher than the actual values. The lower level of utilization of the production apparatus was one of the main reasons for the reduction of its return. In Japan and the FRG the aging of the fixed capital resulting from the decline in the intensiveness of its renewal also had an effect. But the character of accumulation of recent years makes it possible to anticipate a change in these tendencies.

A unique feature of the current period in the industrial development of leading capitalist powers consists in having elements of new and past bases (with a prevalence of the latter) working side by side. Largely because of this the effect from the intensification of the investment process on the basis of new generations of technical equipment is not yet being fully manifested. But at the same time this structure of the basic capital provides an impetus for updating the production apparatus. One should keep in mind that the development of capitalist production in the 1980's can be provided with a lower norm of accumulation since prices for the most promising kinds of technical equipment are decreasing. Thus the internal laws of the reproduction of fixed capital can potentially contribute to enlivening accumulation and economic growth.

But at the same time there are also negative factors in operation. The new militarization under the conditions of the economic instability increases the deficit of the state budget, destabilizes the credit and monetary sphere, and worsens the conditions for financing investments. There is an aggravation of social contradictions caused by the introduction of technical equipment with a large labor-saving effect. Moreover, under capitalism technical progress is not a goal in itself but only one of the means of maximizing profit. Since the end of the 1970's real earnings have been decreasing. This direct encroachment on the interests of the workers under the conditions of mass unemployment makes it possible for the entrepreneurs to achieve increased profit as a result of redistributing income. In such a situation the stimuli for technical reequipment of the capitalist economy grow weaker and, as a result, its restructuring is prolonged.

## FOOTNOTES

1. The causes and the peculiarities of the modern structural reorganization of the economies of capitalist countries have been analyzed, for example, by L. P. Nochevkina. See: "The Economic Position of Capitalist and Developing Countries," an appendix to the magazine MIROVAYA EKONOMIKA I MEZHDUNA-RODNYYE OTNOSHENiya, 1985.

2. The capital-intensiveness was calculated as the ratio between the growth cost of fixed capital and the conventional net output of the branch.

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### Dynamics of Eating, Sleeping Cycles

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pp 207-218

[Article by L. Ya. Glybin, candidate of economic sciences, chief of the Kray Consultation-Cardiological Center (Vladivostok): "Some Thoughts About the Regimen of Sleep and Nutrition"]

[Text] The rapid rates of scientific and technical progress have their "reverse side." We have an "epidemic" of cardiovascular diseases, nervous and emotional stress, injuries, and highway accidents. We are forced to spend immense amounts of money on the creation of a broad scientific research base in order to fight against the ever-increasing threat to the health of the population and to expand the network of therapy and health improvement institutions. One of the constituent parts of good health, sleep, has become a critical problem of mankind during the 20th century. But 45 percent of the city dwellers suffer from various disturbances of it. How can medicine help in the fight against chronic insomnia? What regimen of work and rest seems optimal to medical experts?

Today the fundamental opinion is that there are three biorhythms in the vital activity of human beings. Hence there are three types of work capacities—"morning" (people who are especially efficient at this time are called "larks"), evening ("owls") and undifferentiated ("arrhythmics"). (Footnote 1) For the last type there is no evidence that either the morning or the evening type of work capability prevails. It is thought that the manifestation of these peculiarities of man is linked to the sleep rhythm. People who go to bed early and wake up early are of the morning type. It is thought that people of the evening type prevail among students and workers engaged in mental labor. On the other hand, in Khamp's research (Footnote 2), only 52 percent of the 400 people questioned had a marked predominance of this type of labor activity. Of these people 35 percent were included with the "owls" and 17 percent—"larks," and among people of the evening type the subjective evaluation did not correspond to the actual work capability in 55 percent of the cases.

Where do specialists begin when determining the biorhythmological types of work capability? The examinations, questionnaires and interviews they conduct

pertain to the peculiarities of sleep and cheerfulness, daily fluctuations in mood, attitude and activity, and the time of maximum work capability. The major aspect in determining the type of work capability is the opinion of the people who are being examined. But we are well aware that a subjective evaluation of work activity is conditioned by both social circumstances and the personality characteristics, particularly the inability to plan the work day. This inability results in a shortage of time, which leads to the need to work during the late evening hours and at night.

References to experimental research that confirms the morning, evening and undifferentiated types of work capability and people (Footnote 3) is not always convincing and here is why. Even before the experiment the participants have been grouped according to types of work capability on the basis of their answers. The answers were incomplete: again they did not take into account the social factors that unquestionably influence the life activity. The conditions were not always the same for all the participants in the experiment. And the time of going to sleep and waking up differed. One would wake up of his own accord and they would make their measurements while others were awakened and then they took down the indicators.

The clinical-statistical and experimental research we conducted made it possible for us to establish a cyclicity within the 24-hour period with periods of about 4-6 hours in the dynamics of physiological functions and indicators of man's physical capability of work. Throughout the course of the day there were five physiological upswings (at about 5 am, 11 am, 4 pm, 8 pm, and 12 midnight) in the vital activity of a human being and an equal number of declines (about 2 am, 9 am, 2 pm, 6 pm, and 10 pm)—here and henceforth we are using "wintertime"—which also determined the rhythm of the labor activity. The pattern that was revealed could actually be verified by anyone. If you set the goal of monitoring your condition, you will discover the following. If you go to bed between 9 and 10 pm and awaken at about 4-5 am, you will feel cheerful, active, in a good mood, and ready for hard work. But at about 9 am you will experience fatigue and there will be sluggishness in your movements and apathy. This pertains also to those whose production activity begins at 9 am: they need about an hour in order to "enter in" to the work rhythm. Their work is most active at 11 am. Then there is the decline that comes at 2 pm during which many people experience a desire to rest or even lie down. At about 4 pm there condition evens out and at 6 pm they are tired again, which is linked to the end of the work day. At 8 pm their work capability increases again and then decreases by 10 pm and there is a desire to go to sleep. And if certain social factors (an interesting television program, an urgent preparation of a report, and so forth) makes it impossible to do this, by 12 midnight they no longer want to go to sleep. Moreover, at about midnight there is a surge of creative activity which people engaged in mental labor frequently take advantage of. But then at

2-3 am the need for sleep wins out. For those who go to sleep at 2-3 am, even if they sleep late in the morning, there is a slowing down and a reduction of work activity throughout the day.

1 This rhythm of the work capability was confirmed by a special questionnaire we circulated. Drivers of Automotive Column 1272 of the Far East Transportation Administration and the Turist Automotive Base, workers at one of the city's research institutions, and students of the Vladivostok Medical Institute evaluated their labor activity throughout a 24-hour period. Each was given questions which helped to clarify their general condition, cheerfulness, activity, fatigue, reduced attention and work capability throughout the work day. These questions were also included: at what hour of the day do you get hungry and when do you wish to go to sleep? At what time does a person go to bed and when does he get up? Were they impeded by television programs at bedtime, and so forth. And so about 5 am, 11 am, 2 pm, 8 pm and 12 midnight they were in a good mood, cheerful, active, and able to work efficiently, and at about 2 am, 9 am, 2 pm, 6 pm and 10 pm they experienced fatigue, a desire to rest, and a reduction of work activity.

An analysis made it possible to reveal that going to bed late involves certain social factors—interesting television programs after the program VREMYA, preparing school assignments and reports, and scientific work (at night it is quiet at home and nobody bothers people). We note that those who were questioned were unanimous about the undesirability of television after 9 pm. Many, especially women, referred to working late. The need to go to the store after work, prepare dinner, prepare the children for school, and do other immediate chores leads to a situation where a person is "running around" until 9-10 pm. And after this they want to read a while, watch television, and so forth.

Practically all the people questioned, including students and scientific workers, wanted to work only during the first half of the work day (from 6 am until 2 pm), and for during that time they have their greatest work capability and they feel good. And only one (a driver) preferred to work during the second half (from 4 pm until midnight) since the traffic slows down sharply during these hours. Those who get out of bed at 7-8 am explain this by the fact that their work day begins at 9 am. Even if they wake up at 4-5 am, they usually "sleep in" until 7-8 am since they simply have nothing to do in the early morning hours.

"We must remember our daily rhythm: deliberately take advantage of the hours that are favorable for activity, and during the periods of minimal activity, create favorable conditions for sleep. The most intensive activity (mental and physical) should take place during the morning and daytime hours.... By night the intensiveness of activity should gradually decrease. Unfortunately, too frequently exceptions are made to this rule.... We must recall that regular resistance to the natural rhythm has an

unfavorable effect on sleep... The organization of the correct rhythm of the day is the best preparation for normal sleep,"—such is the opinion of one of the leading domestic researchers in the area of physiology and pathology of sleep, Professor A. M. Veyn. (Footnote 4) The rhythm that has been discovered within the 24-hour period makes it possible to approach a solution to this problem. And the lack of correspondence between certain norms of labor legislation and the conclusions of labor physiology is considered by medical experts to be one of the most crucial problems. In particular, it is necessary to consider the possibility of synchronizing biological and social factors that affect the vital activity of man. This synchronization should be based on recommendations concerning the optimal, efficient regimen for work and rest throughout the course of a 24-hour period.

We suggest planning labor processes in any sphere of production in such a way that the most responsible and difficult moments of work come during "favorable" time segments, that is at 5 am, 11 am, 4 pm, 8 pm and 12 midnight. We think that the work day should be started at 5-6 am and ended by 1-2 pm. Other variants are also possible, but they should exclude "unfavorable" hours from the difficult periods of labor activity. This pertains primarily to continuous kinds of production. It has been noted that it is precisely during the hours of physiological declines that the probability of injuries and automobile accidents reaches its maximum. We have also proved that during these hours there is the greatest probability of developing an acute myocardial infarction among patients suffering from heart disease; elevation of blood pressure in hypertonics; aggravation of stomach and duodenal ulcers, and other diseases and complications.

The crow of the rooster. At the same morning hour, regardless of the season, we hear his voice call out announcing the beginning of the work day. But is it only roosters that have "biological hours"? No. Observations of motor activity of wild and domestic animals show convincingly the cyclical nature of the vital activity of everything living on earth. Usually their active life begins somewhere around 5 am. But if one arrives at a zoo or an animal farm at 9 am one can see how the workers are trying with all their might to awaken the animals to show them to the visitors. It is very difficult for them to do this. Experimental observation of wild animals has shown that they are active during the same hours as people are.

The rhythm of the feeding and motor activity of domestic animals is shown most clearly during the pasture period. Cows are "willing" to graze after 5 am, but by 9 am the rate declines sharply and their motor activity becomes minimal. By 11 am there is again a significant increase in the activity of animals, which declines again by 2 pm. By observing animals throughout the course of the 24-hour period we can establish that their motor activity is also greater at about 4 pm, 8 pm and 12

midnight and it declines at 6 pm, 9 pm and 2 am. Thus in domestic animals as in people there is a 4-6 hour period in the dynamics of physiological processes. This must be taken into account, particularly when feeding and milking cows. This fact is instructive: each day in maritime kray alone about 25 percent of the productive herd is slaughtered. The main reason for this is mastitis (inflammation of the mammary glands). And this means that the existing rhythm for milking cows (2-3 times) from the standpoint of the rhythm within the 24-hour period is physiologically incorrect and harmful. The rhythm for feeding and milking should involve four times! Actually, this is the way it used to be done. And this is the way they do milking now, too, for example, in Cuba (there the cows produce up to 107 liters of milk per day!)

But now let us return to the rhythm of the sleep and wakefulness of the human being. It has been experimentally established (and anyone can verify this) that if one goes to sleep between 9 and 10 pm it is easier to get up at 4-5 am than it is at 7-9 am. And the important thing is that getting up at early morning hours contributes to better work efficiency and better feelings throughout the course of the day. But if you get up at 7 or 8 or 9 am, then, as a rule, you will be dissatisfied with your night's sleep, you will slow down after waking up, and you will want to continue to sleep. There is a reduction of the general sense of well-being throughout the day. A decline is clearly marked about 2 pm and there is a desire to rest or to lie down. But if you go to bed at 11 pm you will not fall asleep as quickly. This is probably a reflection of the meaning of the old proverb: "The first (best) sleep is before midnight"—since those who go to sleep between 9 and 10 pm have much greater labor activity the next day. It is no accident that at about 9 in the evening there is a natural desire to go to sleep and at about 4 am one wakes up of his own accord. The biological meaning of this is that at 9 pm there is one of the physiological declines, and at about 5 am—the maximum physiological upsurge. Incidentally, there is no need for the morning sleep we allow ourselves on Sundays. Just as there is no need for healthy adults to sleep during the day. Here it is appropriate to recall the statement of the famous physiology professor N. Ya. Pern. "Long sleep does not increase work efficiency (or vital activity in general) but, on the contrary, is more likely to reduce it." (Footnote 5) This is what Professor A. M. Veyn has to say about this: "It should be emphasized that it is harmful to sleep too much. The subjective need for prolonged sleep frequently does not reflect a real need for it, it is a consequence of a habit frequently formed in childhood. Too much sleep for children contributes to the development of a phlegmatic nature, retards mental development, and disturbs functions of blood circulation and digestion." (Footnote 6)

We say: "Morning is wiser than evening." The English have a saying: "Early to bed, early to rise, makes a man healthy, wealthy and wise." Such proverbs and sayings which reflect folk wisdom can tell us a great deal. But

when should one go to sleep? As the research has shown, the most favorable time for this is between 9 and 10 pm or, more precisely, right after 9 pm. And here special attention should be devoted to the time of the end of the television program. Television, being a powerful social monitor, delays and reduces the natural desire to sleep. This naturally leads to various disturbances, including to chronic (daily) insomnia and a reduction of work efficiency. It is necessary for television programs, at least the most interesting ones, to end by 9 pm. And evaluating the situation as a whole one can speak of a lack of medical and physiological justification for watching television after 9 pm.

Since ancient times, people have inherently had a "sunrise" type of activity. This system remains up to the present in rural areas. Here it is pleasant to go to bed a little earlier and to get up "with the birds." And here they suffer less from the "diseases of the age." Of course they have clean air and constant physical exercise.... But still the main thing, in our opinion, lies elsewhere—in the synchronization of the "biological hours" and the activity of the organism. Scientific and technical progress has contributed to increased migration of the rural population to industrial centers. Urbanization has set its own rhythm, its own system, which is different from the ancient ones. But is it not this, in combination with other factors, that has caused us to have such frequent undesirable "guests" as heart disease, hypertonia, arterial sclerosis and other diseases?

Today the majority of city dwellers live at odds to their natural (biological) rhythm. But it has already been proved that vital activity that goes against this rhythm leads to various pathological processes. Scientists throughout the world include among the factors causing the "epidemic" of cardiovascular diseases (stenocardia, acute myocardial infarction and others) such social factors as nervous and psychological tension, nutritional conditions, and the rhythm of work and rest. A colossal amount of scientific research work is being done in this area and immense amounts of money are being spent. But still the successes are modest so far. What is the matter?

We have our own research regarding this issue. This is what we would like to draw attention to. Why do people with long lives (and not only in Abkhazia) begin their work day no later than 6 in the morning? How does one explain the official figures of 1982 concerning the reduction of the number of hospital patients in connection with the changeover to "summer time." After all, all that happened was that our working day began at an earlier hour! And do we really have a right to expect that nervous and psychological tension (even partially) will be removed if people go to bed on time and if they have an adequate rhythm for their work, rest and nutrition? It is on this basis that one should arrange the prevention of various diseases. All this should undoubtedly lead to a sharp reduction of the "diseases of the age." And yet this not only makes medical and biological sense, but also

economic sense. One must say that this problem has been resolved in the German Democratic Republic and in a number of other countries. Why do we not take advantage of their experience?

Incidentally, it is not at all mandatory that people begin to work at 5-6 in the morning. One can begin work at 7 if there are difficulties with transportation. But we should get up at about 4 am—this is what our biological rhythm requires. The periods of physiological well-being of the organism within the 24-hour period do not depend on the time of year. The overall activity (amplitude) of the cycle changes, but not the rhythm itself. Moreover, judging from scientific literature and our own research, the pattern that has been discovered does not depend on the geographical coordinates—latitude and longitude. This latter circumstance makes it possible to assume that the work of biological clocks is strictly correlated to some cosmophysical factors (factor) that has not previously been taken into account and cannot be reduced to the position of the earth in its orbit around the sun.

The 24-hour rhythm that has been discovered in the physiological well-being of the human organism gives one reason to revise certain ideas about a healthy way of life. But are we in a position to interpret and understand the reserves of health, labor activity and longevity that are uncovered when we call on our own nature for assistance? And is it possible in view of the stereotype for living that has taken form in past decades to combine the hands of the biological and social clock and synchronize them?

Today we speak about the inadequacy of the production rhythm to man's biological capabilities. There is no doubt about the lack of correspondence between certain norms of labor legislation and the conclusions of physiology and medicine. In particular, with the existing work schedule there would have to be two meal breaks—at about 10 am and 3 pm. And one can give a fairly large number of examples like this. It is understandable that the shift of work time to the early morning hours would seem unusual to the majority of us. Moreover, this involves problems on a statewide scale: so it would be necessary to change the hours of operation of kindergartens and day nurseries, schools, stores, theaters, public transportation, and so forth. But there is some point in solving this difficult socioeconomic problem since it is linked to preserving and strengthening the health and increasing the lifespan of people.

But our life is closely linked to the interests of production. Can we be confident that shifting the beginning of the work day to the evening morning hours will contribute to the task of the day: sharply increasing labor productivity? There is no doubt that it would. Is it difficult to calculate the economic effect of the first half of the work day and the second? Actually, it is known, and the figures are certainly not in favor of the hours after meals. And we all know this even without calculations. People are willing to work only up until 1 pm, and

during the second half of the work day they usually just put in their time. We repeat: the question of shifting the beginning of the work day to the early morning hours is not easy. But, after all, we were able to make the switch to "summer" time. This step seemed risky, but look at how it has justified itself!

Only the first steps have been taken in the study of the 24-hour rhythm. Further fundamental research is needed. This pertains first and foremost to solving the problem of the time adequacy of the therapeutic influence on the human organism, that is, at which hours should one take various medicines, and do physical therapy procedures and operational intervention, and other preventive and therapeutic measures. We have not yet solved the problem of the physiological optimum of the watch (on navy ships) and shift rhythm for work throughout the 24-hour period. From the standpoint of the 24-hour cycle it is necessary to study the increased productivity of domestic livestock and a number of other no less important things.

Here we shall discuss only one of the problems related to the 24-hour rhythm—human nutrition. Our work efficiency and health are inseparably linked to this. The ancient Greek philosopher Socrates is credited with this saying: "We live not in order to eat, but we eat in order to live."

No less important is the nutrition rhythm, which is also in need of further serious research taking into account biorhythmological factors. How frequently doctors hear complaints from patients about the loss of appetite, pains before eating and afterwards, and so forth? In addition to medication, the doctor usually prescribes a diet. But at what hours of the day should one take food and medication? How many meal breaks should there be during the work day? The same questions arise when determining the eating schedule for nursing babies and older children. There is reason to believe that today the schedule is not only not physiologically correct, but causes a number of undesirable effects. Observations made in a city maternity home of Vladivostok made it possible to establish that the maximum motor activity of children (and this is the determining indicator of work efficiency) comes at the same hours as for adults. Or take this example: it is no secret to anyone that at about 7-8-9 in the morning one does not want to eat, but many people (whoever can) will "drink tea" at about 3 pm. Why at these hours? We have established that hunger and the need to eat appear at about 4 am, 10 am, 3 pm and 7 pm. And for those who work in the late evening hours it comes again at 11 pm. Having analyzed the results that were obtained (and also investigated certain biochemical indicators) we came to the conclusion that one should eat four times a day—at about 4 am and then at about 10 am, 3 pm and 7 pm.

Today we are studying fairly deeply the various aspects of balanced nutrition and the optimal intake of the necessary substances from outside the organism. Here



one takes into account the age, the nature of the labor activity and other peculiarities. Daily norms have been developed for nutritive substances, the calorie content of the diet, energy indicators and so forth. The nutritional schedule is also taken into account.

But still as one asks specialists the question: When specifically should one eat during the course of a 24-hour period? —one will not get a sufficiently convincing answer. As of today the majority of the country's population eats three meals a day, which corresponds to the work rhythm of production enterprises but not the human organism. Judge for yourself. We have breakfast at 7-8 in the morning since we are quite sure: "You have breakfast yourself...." But we do not want to eat at that time. A clear confirmation of this comes from our children. We sometimom 1 to 2 pm. This is a time when the public catering institutions are open. But at about 3 pm there is again a desire to eat. But industry does not provide a second meal break. Not everyone can arrange their schedule. What about the rest of them?

It is important not only not to overeat, but also to distribute eating times correctly throughout the course of the day. The saying that is going around: "Eat all of your breakfast, share your lunch with a friend, and give your supper to your enemy"—is undoubtedly incorrect from the standpoint of biorhythmology. Ask yourself: does the present rhythm of eating suit me? We think that the majority of people will answer negatively. Probably only as a result of this there appeared the appeal: "Eat when you are hungry!" Obviously, this is the most reasonable thing one can think of in such a situation.

This question is not at all an idle one, as it might seem at first glance. We are all working and our eating rhythm is determined primarily by the production possibilities. Can it not be arranged for these factors to be combined? There is no doubt that this can and should be done! As we have said, the feeling of hunger and the need to eat comes to people at about 4 am, 10 am, 3 pm, 7 pm and 11 pm. This is inherent in each person, and there are almost no individual peculiarities. Generalizing all the data we have obtained, we think that everyone, including children and the elderly, should take in food four times a day—at about 4 am, 10 am, 3 pm and 7 pm. Those who work on the night shift should also eat at 11 pm. In spite of the widespread opinion of the existence of biorhythmological types of work efficiency—"larks," "owls" and "arrhythmics"—it seems that there is no need to take these peculiarities into account in the eating schedule. At the same time, with certain diseases of the gastrointestinal tract, the proposed principle for nutrition should be observed unwaveringly, for this is one of the fundamental factors in treating people with ulcers of the stomach and duodenum, gastritis, and other diseases.

The introduction of our recommendations for changing the schedule for sleeping and eating is not simple. But since the described patterns exist, do we have the right to close our eyes to them? Would it not be better to arm ourselves with them and try to change the existing stereotypes?

## FOOTNOTES

1. See V. A. Dofkin and N. A. Lavrentyeva, "Periods of Maximum Work Efficiency and the Daily Rhythm of Physiological Functions," SOVETSKAYA MEDITSINA, No 8, 1984, pp 140-145.

2. "Archives of Psychiatry," No 201, 1961, pp 355-357 (in German).

3. See V. A. Dofkin and N. A. Lavrentyeva, op. cit.

4. A. N. Veyn, "Bordstvovaniye i son" [Wakefulness and Sleep], Moscow, "Nauka", 1970.

5. N. Ya. Perna, "Ritm zhizni i tvorchestva" [The Rhythm of Life and of Creativity], Moscow-Leningrad, Izd. vo "Petrograd," 1925.

6. Ibid., p 53.

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## Problems of Bonuses Satirized

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ORGANIZATSIYA PROMYSHLENNOGO  
PROIZVODSTVA (EKO) in Russian No 6, Jun 87  
pp 219-220

[Article by Oleg Kratov: "We Will Make It Up to You!"]

[Text] Wait, Petrov, do not get mad, do not get mad! What happened? You say you have a bonus coming to you? Let us figure this out now. Sit down and tell me about it.

You say you developed a machine tool for bending pipes? Well, not alone, of course, I understand, with the group. Understandably, you worked a whole year, the problem is not as simple as it seems. They calculated the effect? Ten thousand rubles a year? Good boy, that is really great! That is scientific and technical progress, increased labor productivity, and new technical equipment! With that money you could buy a car!

You say they have already introduced it? And it is working well? That is simply remarkable! Of course you should have a bonus. Now let us see, let us calculate it together.

So, new technical equipment, economic effect of 10,000 rubles, let us look on the table: the bonus is a minimum of 6 percent of the total effect, that is, 600 rubles or more. Not a car, but you could buy a color television set. But according to the instructions, dear, it, this bonus, is

divided up: 50 percent to you and 50 percent to the ministry for the fund for the development of new technical equipment. We must move forward! Do you agree with me?

But 300 rubles is still a lot of money. It is not enough for a color television set, true, but you could buy a black and white one with a large screen. Let us go further. But you and the boys just thought it up and planned everything, but where was it made? There, you see—at the plant. Then according to the provisions you get 60 percent and the plant gets 40 percent. You are left with 180 rubles. That is enough for a portable television set.

But, you see, according to the instructions this money goes to our institute's economic incentive fund. And it consists of three funds: the fund for the development of the organization, the fund for social and cultural measures and housing construction, and the material incentive fund. Thus we can give you an incentive of up to 50 percent, that is, 90 rubles are left. Well, maybe not a television set, but you could buy a radio.

True, you have to take into account that according to the provisions 20 percent of this fund goes for your incentives for the results of the year, and 15 percent for the incentives of auxiliary services. But you reproduced the documentation yourself? No. But the supply, bookkeeping, and technical division? They all worked. For the group you will receive 58 rubles, 50 kopecks. How many people did you say participated in the development? Seven? That is 8 rubles, 35 kopecks each.

And I said you could buy a car! Yesterday in the Detskiy Mir department store they had battery scooters—they were charming, your son would never forget you.

There is just one catch; according to the order bonuses of less than 10 rubles are not to be paid: we can make no sense out of the bookkeeping office. But do not lose heart—create and invent. As soon as you get more than 10 rubles we will pay you immediately. We will make it up to you!

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### Magazine's Literary Standards Questioned

18200191x Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87  
pp 220-221

[Article by N. Nikitin: "I Became Confused"]

[Text] Petushkov's mail came in the morning. Looking through it quickly he immediately found two long-awaited letters. One on of them, in the space for the

return address was the red rectangular stamp, "The Editorial Staff of the Newspaper TRUDOVAYA VAKHTA. The other was from the main administration. Agitation and a mysterious joy gripped Petushkov. He quickly opened up the envelope from the editorial staff and unfolded the sheets of paper.

"Dear Andrey Ippolitovich!

"We read your humoresque carefully. It is written consistently and in intelligible language. The plot develops in a generally logical way, without awkward places...."

"Not a bad beginning," thought Petushkov and, drawing his breath, continued to read.

"But I should like to draw your attention to certain imprecisions in the narrative. A footwear factory called the Crystal Slipper figures in the work. But as you probably know, there is a factory by that name in our city, and this could mislead the reader: for the residents of our city are quite familiar with the real Crystal footwear factory and have long been cursing its, as it were, 'products'...."

"Omigod!" went through Petushkov's head. "The voice of the people...."

He wiped the sweat from his brow and began to read further.

"...Now let us take the part of your story where the hero enumerates the immense prospects (I quote your text): 'They planned a radical modernization of the shops, the introduction of modern machines and equipment, computers and automated control systems, the development of quality control according to the last word in science and technology.'

"Such a pile of grotesque details is unsuitable even for a plot that is known to be fictional—satire should rely on real details of life.... For the reader of your humoresque will probably compare the conditions described in it to the ones he is familiar with in this same Crystal Slipper, and this enterprise, of course, deserves a good story, and not just one of them. They have been talking about modernization for 15 years, but the items are thrown together by ancient methods...."

"Now I have done it!"—Andrey Ippolitovich was struck with terror. "I laid myself wide open!"

"...Taking this into account, it seems to us that it would be better to change the name of the factory to something else, something fictional. The same thing applies to the title of your humoresque—"The Annual Report." This title does not quite fully reflect the essence of the humoristic progression of the work. Then the final blow: 'We fulfill and overfulfill the annual plan!' It is simple, beautiful, and, the main thing, it is very funny.

"We wish you creative success!

"We are awaiting more work.

"Respectfully yours, V. Osinnikov, editor."

"I mixed up the envelopes!"—the bitter truth came to Petushkov slowly and with difficulty. "But if the report went to the editorial staff, does this mean...does this mean that the humoresque went to the main administration?"

Petushkov sat for several minutes holding his head in his hands. Finally, gathering his forces, he opened the second envelope, from the main administration.

"Dear Andrey Ippolitovich!

"We attentively looked over your report. It was written in an unusual, original form. But we do not quite understand why you write about yourself in the third person and give your report such a strange name—"The Downfall of Director Kurochkin," using the pseudonym Kurochkin instead of your real name—Petushkov.

"But in spite of the unusual form of your communication, we managed to figure out its essence and we deeply value your courage and civic pride which enabled you to write such a self-critical report.

"Nonetheless, it should be noted, perhaps, that you place too many demands on yourself as the manager.

"We thank you for your high level of consciousness and are confident that after coping with all the difficulties you will be able to bring the enterprise that has been entrusted to you out of its small slump.

"Deputy Chief of the Soyuzsapog Main Administration, B. Podymayev."

He spent a half hour in thought. Then Petushkov found a copy of the story and began to retype it.

When he sent the letter to the editorial staff he carefully checked the address.

A month later an answer came from the editorial staff:

"Unfortunately the new version of your humoresque is much weaker than the preceding one. We will not be able to use it."

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#### Articles in EKO No. 6, June 87 Not Translated

18200191y Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 6, Jun 87

The following items were not translated by FBIS/JPRS:

Digest: The Crisis of Strategic Planning (p 21) ("Long Ranne [sic] Planning", France, 1986, 19, No 4)

Digest: Models of Industrial Enterprises (p 59) ("Plant Engineering", USA, 1986, v. 40, No.16)

Digest: Strategic Plans and Interests of Managers (p 60) ("Strategic Management Journal", 1986, v. 7, No.4)

Digest: The New System of Service and Repair (pp 60-61) ("Maintenance Management International", Netherlands, 1986, v.6, No.2)

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